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SOFTWARE FOR THE GROUPED OPTIMAL AGGREGATION TECHNIQUE

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SOFTWARE FOR THE GROUPED OPTIMAL AGGREGATION TECHNIQUE

Job Order 72-424

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16. Abstract

The Grouped Optimal Aggregation Technique produces minimum-variance, unbiased estimates of acreage and production for countries, zones (states), or any designated collection of acreage strata. It uses yield predictions, historical acreage information, and direct acreage estimates from satellite data. The acreage strata are grouped in such a way that the ratio model over historical acreage provides a smaller variance than if the model were applied to each individual stratum. An optimal weighting matrix based on historical acreages, provides the link between incomplete direct acreage estimates and the total, current acreage estimate.

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GROUPED OPTIMAL AGGREGATION TECHNIQUE

1. SCOPE

This document contains the description of the Grouped Optimal Aggregation Technique (GOAT). The purposes of the GOAT procedure are:

(1) To calculate minimum-variance unbiased estimages of acreage and production for zones (states), regions and any designated arbitrary collection of acreage strata.

(2) To calculate the mean squared prediction error for the acreage and production estimages.

The procedure uses yield estimates, historical acreage information, and direct acreage estimages for each acreage stratum as inputs.

Included in this document is a system overview, technical description of the GOAT procedure, input formats, contents of the standard and optional output reports, description of the individual subroutines, and description of the CMS GOAT EXEC with an execution sequence for the GOAT procedure.

2. APPLICABLE DOCUMENTS

The following documents forms a part of this specification:

Weighted Ratio Estimation of Large Area Crop Production by Alan H. Fieveson, SR-J1-04036.

3. SYSTEM DESCRIPTION

This section contains the description of the GOAT software and the necessary hardware. It includes: diagrams showing both system level flow and the hierarchy among subroutines, descriptions of the input files and the output, and detailed descriptions of all subroutines. It also contains information about the computer system.

3.1 SYSTEM FLOWCHART

The system level flow diagram for the GOAT Program is given in Figure 3.1.1. A program hierarchy is shown in Figure 3.1.2.

3.2 HARDWARE DESCRIPTION

The software for the GOAT Program is operational on the EODL National Advanced Systems 3000 (AS-3000) at the NASA Johnson Space Center, Houston, Texas. On the AS-3000 the program is run under the Virtual Machine 370 (VM370) Conversational Monitoring System (CMS). GOAT requires the use of disk storage and either a printer or disk for output.

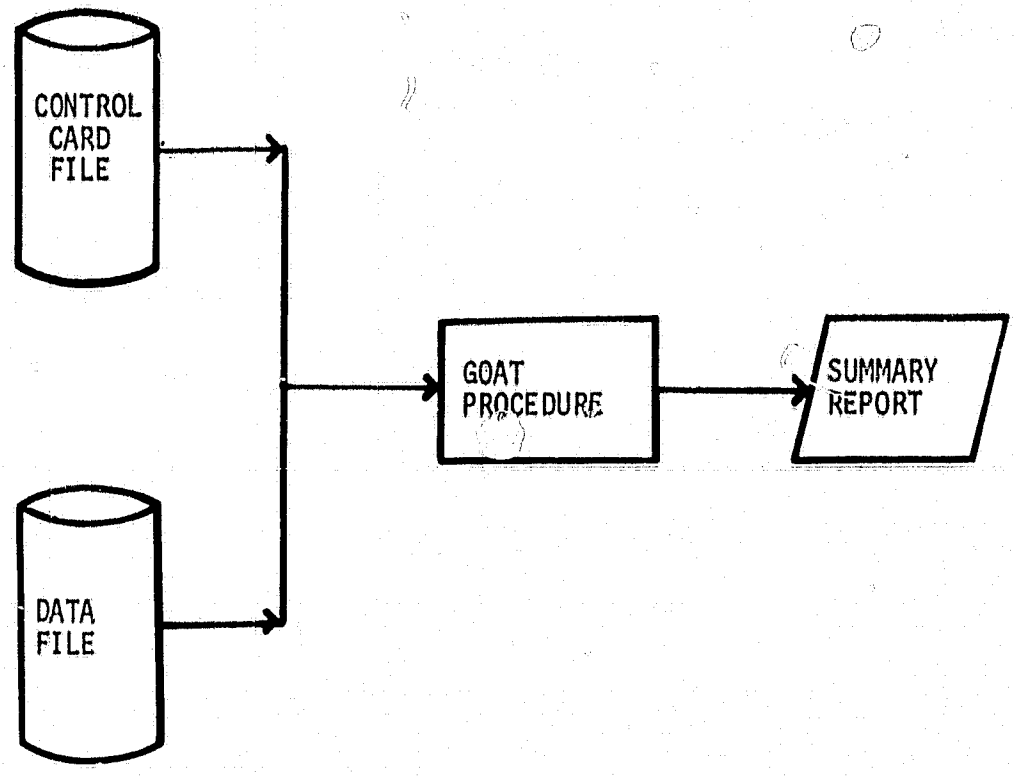


Figure 3.1.1 System Level Flow Diagram for the GOAT Program.

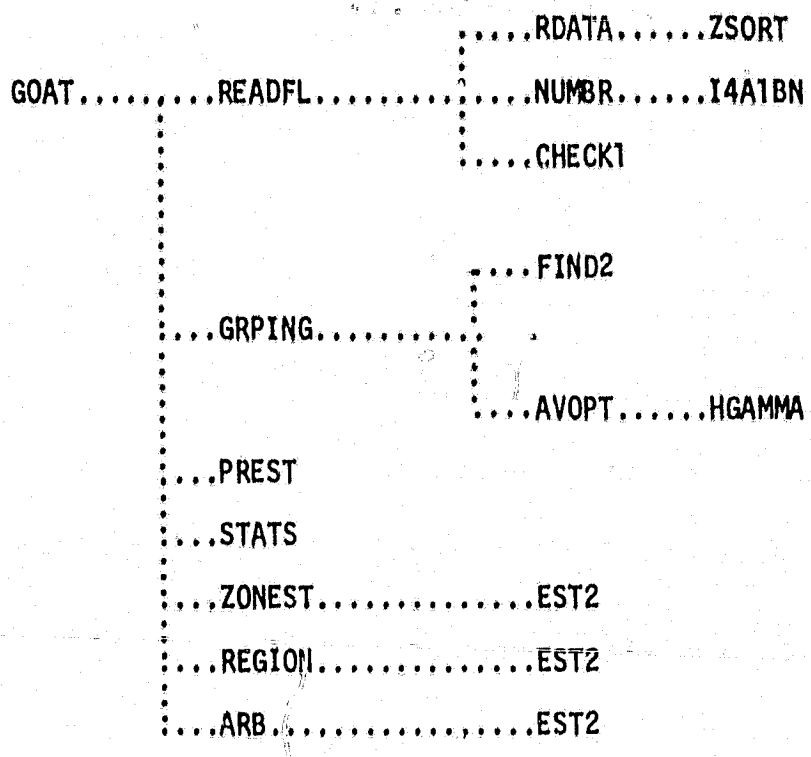


Figure 3.1.2 Hierarchy diagram for the GOAT Program.

3.3 TECHNICAL SOFTWARE DESCRIPTION

The purpose of the GOAT procedure is to calculate minimum variance unbiased estimates of acreage and production for a given region. These estimates are based on a direct satellite imagery data. The region is divided into a total of n acreage strata which become the basic elements on which data are collected. For each acreage strata there are yield estimates, variances of yield estimates, direct satellite acreage estimates, and historical acreage data. In some cases data are lost or cannot be collected and direct acreage data are not available. Thus acreage strata are designated as being of Class I or Class II. Strata having direct acreage estimates are termed Class I and strata having no available direct acreage data are Class II. The GOAT procedure is designed to fully utilize the available Class I direct estimates and the given historical data for both Class I and Class II strata. The preceding, in effect, accounts for the missing Class II data.

The given data set on a region contains information on the n acreage strata. It is assumed that there are a total of m Class I acreage strata, $0 \leq m \leq n$. The region usually is made up of a number of zones (states) each of which consists of a subset of acreage strata from the n total strata. The n acreage strata are also assigned to the yield strata. There is a total of r yield strata, $r \leq n$, each of which consists of a subset of acreage strata. Usually a yield stratum can be considered a zone, but in general this is not the case. The only restriction placed on the strata, zones, and yield strata is that each acreage stratum is assigned to only one zone and one yield stratum.

In general the use of the data in the following equations is represented in standard matrix forms. The matrix notation is given by b, $\underset{\sim}{b}$ and B where b represents a constant, $\underset{\sim}{b}$ represents a vector and B represents a matrix. The transpose of the vector $\underset{\sim}{\alpha}$ is presented by $\underset{\sim}{\alpha}^T$. For each Class I stratum, d_i denotes the direct acreage estimate for the target crop for the current year.

The vector of direct estimates for the m Class I strata is given as

$$\underset{\sim}{d}^T = \left[d_1, d_2, \ldots, d_m \right] .$$

The variance-covariance matrix of d is denoted by Σ and its estimate is

$$\hat{\Sigma} = \text{DIAG} \left[\hat{\sigma}_1^2, \hat{\sigma}_2^2, \ldots, \hat{\sigma}_m^2 \right] .$$

These within-stratum variance estimates, $\hat{\sigma}_i^2$, must be given for each of the m Class I strata. Let $\underset{\sim}{\alpha}$ denote the true acreages of the target crop of the current year. Let $\underset{\sim}{\alpha}$ be partitioned as

$$\underset{\sim}{\alpha}^T = \left[\underset{\sim}{\alpha}_1^T, \quad \underset{\sim}{\alpha}_2^T \right]$$

where $\underset{\sim}{\alpha}_1$ is the m by 1 vector of target crop acreages for the Class I strata and $\underset{\sim}{\alpha}_2$ is the (n-m) by 1 vector for the Class II strata. Note that there are only direct estimates for $\underset{\sim}{\alpha}_1$ given by $\underset{\sim}{d}$. There are no direct estimates for the Class II strata.

For the r yield strata, we denote $\hat{\underset{\sim}{\eta}}$ as the given vector of yield estimates for the n acreage strata.

The partitioning of $\hat{\underset{\sim}{\eta}}$ is done in the same way as $\underset{\sim}{\alpha}$, that is

$$\hat{\underset{\sim}{\eta}}^T = \left[\hat{\underset{\sim}{\eta}}_1^T , \hat{\underset{\sim}{\eta}}_2^T \right] ,$$

where $\hat{\underset{\sim}{\eta}}_1$ is a m by 1 vector of yield estimates for the Class I acreage strata and likewise $\hat{\underset{\sim}{\eta}}_2$ is a (n-m) by 1 vector for the Class II acreage strata. Note that since the number of yield strata, r, is less than or equal to the number of acreage strata, there are usually repeated values in the $\hat{\underset{\sim}{\eta}}$ vector. That

is, there are only r unique yield estimates which correspond to the r yield strata. The vector $\hat{\underset{\sim}{\eta}}^*$ is denoted as the r by 1 vector of unique yield estimates. In order to associate acreage strata with yield strata, the n by r matrix U is defined by

$$U_{ij} = \begin{cases} 1 \text{ if the } i^{th} \text{ acreage stratum is in the } j^{th} \text{ yield stratum} \\ \emptyset \text{ otherwise.} \end{cases}$$

Then the relation between $\hat{\underset{\sim}{\eta}}$ and $\hat{\underset{\sim}{\eta}}^*$ is

$$\hat{\underset{\sim}{\eta}} = U \hat{\underset{\sim}{\eta}}^* .$$

Also corresponding to the vector of yield estimates, $\hat{\underset{\sim}{\eta}}^*$, is the two r by r variance-covariance matrices of T* and Ω^*. The matrix of the estimated variance of the $\hat{\eta}^*$ vector is given by T^*. The estimated variances of the true yield is given by $\hat{\Omega}^*$. Once again in order to associate the n acreage strata with the r yield strata for these two yield variances, the U matrix is used to obtain the two n by n matrices of

$$\hat{T} = U\hat{T}^*U^T$$

and

$$\hat{\Omega} = U \hat{\Omega}^* U^T .$$

The input variables are

$$\hat{\underset{\sim}{\eta}}^{*T} = \left[\hat{\eta}_1, \hat{\eta}_2, \ldots, \hat{\eta}_r\right]$$

$$\hat{T}^* = \text{DIAG}\left[\hat{t}_1, \hat{t}_2, \ldots, \hat{t}_r\right]$$

and

$$\hat{\Omega}^* = \text{DIAG}\left[\hat{\omega}_1, \hat{\omega}_2, \ldots, \hat{\omega}_r\right],$$

in which $\hat{\underset{\sim}{\eta}}$, $\hat{t}_j$, and $\hat{\omega}_j$ must be given for each of the j=1,2,..., r yield strata. The n dimensional vector $\hat{\underset{\sim}{\eta}}$ is

$$\hat{\underset{\sim}{\eta}} = U \hat{\underset{\sim}{\eta}}^* = \left[\hat{\eta}_1, \ldots, \hat{\eta}_n \right]^T,$$

where η_i is one of the r yield estimates of the $\hat{\underset{\sim}{\eta}}^*$ vector corresponding to the ith acreage stratum.

The n by n matrix of $\hat{T}$ is given by

$$\hat{T} = \text{B-DIAG}\left[\hat{t}_1 \, J_1, \hat{t}_2 \, J_2, \ldots, \hat{t}_r \, J_r \right]$$

where $\hat{t}_j$ is the variance estimate for the j^{th} yield stratum, and J_j is a k_j by k_j ones matrix where k_j is the number of acreage strata in the j^{th} yield stratum. Note that the total number of acreage strata n is denoted by

$$n = \sum_{j=1}^{r} k_j$$

Note that B-DIAG stands for blocked diagonal matrix. For the n by n variance matrix $\hat{\Omega}$, the result is similar to the $\hat{T}$ matrix; that is

$$\hat{\Omega} = \text{B-DIAG}\left[\hat{\omega}_1 \, J_1, \hat{\omega}_2 \, J_2, \ldots, \hat{\omega}_r \, J_r \right]$$

where $\hat{\omega}_j$ is the variance of the true yield estimate for the j^{th} yield stratum and J_j is defined above.

In determining estimates in the GOAT procedure models for the crop acreage data are first considered.

The unknown crop acreages for the current year is assumed to fit the ratio model of:

$$\underset{\sim}{\alpha} = \gamma \underset{\sim}{h} + \underset{\sim}{\varepsilon} \qquad (1)$$

where γ is a proportionality constant, $\underset{\sim}{h}$ is an n by 1 vector of historical ratio crop acreages and $\underset{\sim}{\varepsilon}$ is the random error term. The variance-covariance matrix for the error term $\underset{\sim}{\varepsilon}$ is given by the n by n matrix H. The H matrix is assumed to be diagonal and partitioned into elements for the Class I for Class II strata as

$$H = \text{B-DIAG}\ [H_1, H_2]$$

where H_1 is a m by m matrix and H_2 is a (n-m) by (n-m) matrix. The above ratio model can be generalized for any two consecutive years. The general form of the ratio model becomes

$$\underset{\sim}{\alpha}_t = \gamma_t \underset{\sim}{\alpha}_{t-1} + \underset{\sim}{\varepsilon}_t \qquad (2)$$

where $\underset{\sim}{\alpha}_t$ is the n by 1 vector of true crop acreages for year t, likewise $\underset{\sim}{\alpha}_{t-1}$ for year t-1, γ_t is the proportionality constant between the two consecutive years t and t-1, and $\underset{\sim}{\varepsilon}_t$ is the random error term.

In the input data set there are a total of N historical years of the best acreage estimate of $\underset{\sim}{\alpha}_t$. These values are denoted as $\underset{\sim}{a}_t$, t=1,2,...N. Note that the h vector given for the ratio model (1) can be chosen to be anyone of these N historical acreage vectors $\underset{\sim}{a}_t$ or some other given historical acreage data for another year. In fact it can be assumed that there is a gap of k years between the current year and the historical ratio year (h). Toward this end the ratio model takes on the following form:

$$\underset{\sim}{\alpha}_{T_0+k} = \gamma^k \underset{\sim}{\alpha}_{T_0} + \underset{\sim}{\varepsilon}_{T_0+k} \qquad (3)$$

where T_o is the selected ratio year, k is the number of gap years, and γ^k is the proportionality constant to be determined. In this model, $\underset{\sim}{h}$ is the best estimate of $\underset{\sim}{\alpha}_{T_o}$ and $\underset{\sim}{\alpha}_{T_o+k}$ is the true acreage estimated for the T_o+k current year.

The estimate of the H matrix is now found by first finding the estimates for γ_t and γ^k. The estimate of γ^k is given by

$$\hat{\gamma}^k = \sum_{j=1}^{m} d_j \Big/ \sum_{j=1}^{m} h_1(j) \qquad (4)$$

where $\underset{\sim}{h}_1$ is a m by 1 vector from $\underset{\sim}{h}$ corresponding to the Class I acreage strata. The maximum likelihood estimates of γ_t are found by solving the following nonlinear equation,

$$\sum_{i=1}^{m} p(t,i) \Big/ \hat{\gamma}_t = \sum_{i=1}^{n} \left[(1- p(t,i))\, p(t-1,i) \Big/ (1-\hat{\gamma}_t\, p(t-1,i)) \right] \qquad (5)$$
$$(t=2,3,\ldots,N)$$

where p(t,i) is the percentage of crop coverage in year t for stratum i and is given by

$$p(t,i) = a_t(i) \Big/ A_i \qquad (6)$$

where $a_t(i)$ is the i^{th} element of $\underset{\sim}{a}_t$ and A_i is the total area for the i^{th} acreage stratum. The H matrix is then found by first computing:

$$\hat{\delta}^2_{t,i} = \left[(p(t,i)-\hat{\gamma}_t\, p(t-1,i) \right]^2 \Big/ \left[\hat{\gamma}_t\, p(t-1,i)(1-\hat{\gamma}_t\, p(t-1,i)) \right]. \qquad (7)$$

Next, $\hat{\theta}^2$ is computed as

$$\hat{\theta}^2 = \sum_{i=1}^{n} \sum_{t=2}^{N} A_i\, \hat{\delta}^2_{t,i} \Big/ n(N-1) \qquad (8)$$

and

$$\hat{\theta}^2_i = \hat{\theta}^2 \Big/ A_i \qquad (i=1,2\ldots,n\ .) \qquad (9)$$

Finally the diagonal estimates of the H matrix are found to be,

$$\hat{H}(i,i) = A_i \, \hat{\theta}_i^2 \; p(T_o, i) \, \hat{\gamma}^k \cdot$$

$$\left[\frac{(\hat{\gamma} X_i)^k - 1}{\hat{\gamma} X_i - 1} - \hat{\gamma}^k \; p(T_o, i) \left(\frac{X_i^k - 1}{X_i - 1} \right) \right] \qquad (10)$$

where $X_i = 1 - \hat{\theta}_i^2$ and $\hat{\gamma}$ is given by

$$\hat{\gamma} = \left[\hat{\gamma}^k \right] \; 1/k \qquad (11)$$

The true production of the target crop for the current year is given by

$$p = \underset{\sim}{y}^T \underset{\sim}{\alpha} \qquad (12)$$

where $\underset{\sim}{y}$ is the n by 1 vector of true yield values. The general form of the production estimator is given by

$$\hat{p} = \underset{\sim}{\hat{\eta}}^T \; \underline{\overline{X}} \, \underset{\sim}{d} \qquad (13)$$

where $\underline{\overline{X}}$ is a n by m matrix. As will be seen, this estimator for production gives rise to an acreage estimator, $\hat{A}$. The $\underline{\overline{X}}$ matrix is to be determined so that the production estimate has unbiased and minimum variance properties. The focal step of the GOAT procedure is to find this optimal matrix $\underline{\overline{X}}$ which minimizes the variance of the production estimate. In order to find the form of this $\underline{\overline{X}}$ matrix, the mean squared prediction error (MSPE) of the production estimator is minimized and it is given by:

$$\hat{E}(\hat{P}-P)^2 = \underset{\sim}{\hat{\eta}}^T \hat{H} \underset{\sim}{\hat{\eta}} + \hat{\gamma}^2 \underset{\sim}{h}^T(\hat{\Omega} + T) \underset{\sim}{h}$$

$$+ \text{tr}\,(\hat{H}\,\hat{\Omega}) + \underset{\sim}{\hat{\eta}}^T \underline{X} (\hat{\Sigma} + \hat{H}_1) \underline{X}^T \underset{\sim}{\eta}$$

$$+ \text{tr}\,(T\underline{X}\,(\Sigma + H_1)\,\underline{X}^T) - 2\underset{\sim}{\eta}^T \underline{X} \hat{H}_1 \underset{\sim}{\hat{\eta}}_1 \qquad (14)$$

where tr denotes the trace of a matrix. For the production estimate to be unbiased, we find that the $\underline{X}$ matrix must meet the restriction

$$\underline{X} \underset{\sim}{h}_1 = \underset{\sim}{h} \quad , \qquad (15)$$

that is multiplying the n by m $\underline{X}$ matrix on the right h_1 by the Class I ratio year acreage values results in the n acreage strata values. For the production estimate to have minimum variance, the MSPE of production is minimized with respect to $\underline{X}$ and find that

$$\underline{X} = (\underset{\sim}{h}_1^T B^{-1} \underset{\sim}{h}_1)^{-1} \left[\underset{\sim}{h} - RB^{-1} \underset{\sim}{\hat{h}}_1\right] \underset{\sim}{h}_1^T B^{-1} + RB^{-1} \qquad (16)$$

where $B = \hat{\Sigma} + \hat{H}$, the n by m matrix R is given by

$$R = (1+\underset{\sim}{\hat{\eta}}^T \underset{\sim}{g})^{-1} \underset{\sim}{g}\, \underset{\sim}{\hat{\eta}}_1^T \hat{H}_1 \qquad (17)$$

where the n by 1 g vector is given by

$$g = U(U^TU)^{-1} (\hat{T}^*)^{-1} \underset{\sim}{\hat{\eta}}^* \quad . \qquad (18)$$

Note that

$$(U^T U) = \text{DIAG}\left[k_1, k_2, \ldots, k_r\right]$$

where k_j is the number of acreage strata in the j^{th} yield stratum.

An acreage estimator is found to be a special case of production estimation. In the production estimator, let $\hat{\pi} = \underset{\sim}{e}$ is a n by 1 vector of ones and $\hat{\Omega} = \hat{T} = 0$. In this special case,

$$\hat{A} = \underset{\sim}{X}^T \underset{\sim}{d} \tag{19}$$

where $\underset{\sim}{X}$ is a m by 1 vector, defined by

$$\underset{\sim}{X} = \left(\underset{\sim}{h}_1^T B^{-1} \underset{\sim}{h}_1\right)^{-1}\left[\underset{\sim}{h}^T \underset{\sim}{e} - \underset{\sim}{e}_1^T \hat{H}_1 B^{-1} \underset{\sim}{h}_1\right] B^{-1} \underset{\sim}{h}_1^T + B^{-1} \hat{H}_1 \underset{\sim}{e}_1^T \tag{20}$$

where $\underset{\sim}{e}_1$ is a m by 1 vector of ones. The MSPE of acreage is found to be

$$\hat{E}(\hat{A}-A)^2 = \left(\underset{\sim}{h}_1^T B^{-1} \underset{\sim}{h}_1\right)^{-1} \left(\underset{\sim}{e}^T \underset{\sim}{h} - \underset{\sim}{h}_1^T B^{-1} \hat{H}_1 \underset{\sim}{e}_1\right)^2$$

$$- \underset{\sim}{e}_1^T \hat{H}_1 B^{-1} \hat{H}_1 \underset{\sim}{e}_1 + \underset{\sim}{e}^T \hat{H} \underset{\sim}{e} \tag{21}$$

where $B = \Sigma + H_1$.

In order to further utilize the data, the acreage strata are grouped according to how well the ratio model (1) fits. The acreage strata are divided into groups which give smaller estimates of the H matrix for each group than if H is estimated using all of the strata. A grouping of the strata is found in which the ratio model fits better than if it were applied to the entire collection of strata. To test whether the H matrix is small for a group, the MSPE of the acreage estimate which is given in equation (21) is considered. V(i) and V(j) denote the MSPE for two groups and V(i,j) denotes the MSPE

after combining the acreage strata of the i^{th} and j^{th} group. The two groups will be combined if

$$V(i,j) < [V(i) + V(j)] \quad . \tag{22}$$

Otherwise the two groups are left as two separate groups. A complete search of all the possible combinations of the acreage strata for grouping search is not practical, since there is a large number of possible matches even for a small number of strata. Instead, the grouping search is started by considering each stratum as a group and key on the stratum having the minimum acreage value in the historical year used in ratio model (1). This minimum historical acreage stratum is then considered and the following ratio of the acreage MSPE is found

$$\rho = [V(i^*) + V(j)] \; / \; V(i^*,j) \tag{23}$$

where i^* indexes the group having the minimum historical acreage and j indexes a group that is eligible to be combined with the i^* group. The maximum ρ value is found as

$$\rho_{MAX} = \left[V(i^*) + V(j_{MAX}) \right] \; / \; V(i^*,j_{MAX}) \tag{24}$$

where j_{MAX} indexes the jth group eligible to be combined with the j^* group that results in the maximum ρ value. Whether or not to combine the i^* and the j_{MAX} groups is then decided. If it is found that

$$\rho_{MAX} < 1.0 \; , \tag{25}$$

then the two groups are not combined. The i^* group is then flagged as ineligible for grouping in the current step of the search. The next largest minimum historical value among the nonflagged strata is then found. After a combination has occurred, then any flagged strata are reconsidered for grouping.

Note that for each stratum, the grouping search requires information indicating which of the other n-1 strata are eligible to be combined to it. This inputted information is used to create the join matrix given as

$$\text{JOIN}(i,j) = \begin{cases} 1 \text{ if the } i^{th} \text{ acreage stratum can be grouped with the } j^{th} \text{ stratum.} \\ 0 \text{ Otherwise} \end{cases} \quad (26)$$

where $i,j = 1,2,3,\ldots,n$. Also note that for the Class II acreage strata, the grouping search must combine a Class II stratum to at least one Class I stratum. This is because an estimate of γ must be associated to the Class II strata. In order to accomplish this association in the grouping search, we automatically combine the i* Class II to the j_{MAX} Class I strata. In this case for the Class II strata, ρ_{MAX} becomes

$$\rho_{MAX} = V(j_{MAX}) \; / \; V(i^*, j_{MAX}) \quad (27)$$

because V(i*) does not exist for the case of a Class II stratum. A Class II stratum cannot be directly combined with another Class II stratum.

After the above grouping search is completed, the optimal matrix $\underline{\overline{X}}$ is found group-by-group. That is, equation (16) is applied to just the acreage strata belonging to a group and a sub-block of element values for the $\underline{\overline{X}}$ matrix is found. The $\underline{\overline{X}}$ matrix is built by placing these group subblocks together into the final optimal matrix $\underline{\overline{X}}$. This completed matrix is then used in the production estimate.

The estimations for any given subset of the acreage strata is found by the following process. S denotes the set of acreage strata that makes up a zone, the region or any arbitrary subset of strata. To find the production estimate, a masking operator is applied with respect to S and find

$$\hat{P}(S) = \underset{\sim}{\hat{\eta}}_o^T \, \underline{\overline{X}} \, \underset{\sim}{d} \quad (28)$$

Where $\underset{\sim}{\eta}_o$ is the vector of yield estimates for the acreage strata in S only. That is, the yield estimate values for strata not in S marked out of the vector $\underset{\sim}{\eta}$. The masking occurs by setting the element to zero. The estimate of MSPE for production becomes

$$\hat{E}(\hat{P}-P)^2 = \underset{\sim}{\eta}_o^T \hat{H} \underset{\sim}{\eta}_o + (\hat{\Gamma} \underset{\sim}{h})^T (\hat{\Omega}_o + \hat{T}_o) (\hat{\Gamma} \underset{\sim}{h})$$

$$+ \text{tr} (\hat{H} \hat{\Omega}_o) + \underset{\sim}{\eta}_o^T \left[\underline{X} (\hat{\Sigma} + \hat{H}_1) \underline{X}^1 \underset{\sim}{\eta}_o\right]$$

$$+ \text{tr} \left[T_o \underline{X} (\Sigma+H_1) \underline{X}^T\right] - 2 \underset{\sim}{\eta}_o^T \underline{X} H \underset{\sim}{\eta}_{o1} \qquad (29)$$

where η_o, Ω_o and T_o indicate that elements, rows, and columns corresponding to strata not in S are masked out. Also, the n by n matrix Γ is defined as

$$\hat{\Gamma} = \text{DIAG} (\hat{\gamma}^{(g_1)}, \ldots, \hat{\gamma}^{(g_n)}) \qquad (30)$$

where g_i is the index of the group containing the i^{th} stratum and $\gamma^{(g_i)}$ is the estimate of gamma for this group. The acreage estimate for S becomes

$$\hat{A}(S) = \underset{\sim}{X}^T \underset{\sim}{d} \qquad (31)$$

where the i^{th} element of the X vector is found to be

$$X(i) = [C_2(i)/C_1(i)] [h_1(i)/b(i)] + [\hat{H}(i,i)/b(i)] \qquad (32)$$

where is taken over the coverage set S*. That is, for strata not in S*, the corresponding element of $\underset{\sim}{X}$ is set of zero. This coverage set S* is defined as the union of all groups of strata which have at least one stratum in S. Then

$$C_1(i) = \sum_j [h_1^2 (j)/b(j)] \qquad (33)$$

where b(j) is the j^{th} element of the B matrix and the summation is taken over the strata of the group in which the i^{th} stratum is found in. Also,

$$C_2(i) = \sum_j h(j) - \sum_j \left[h_1(j)\ \hat{H}_1(i,j)/b(j) \right] \qquad (34)$$

is where both summations are taken over the strata contained in the intersection of S with the group in which i^{th} strata is found. Also, the first summation is for all the strata and the second summation is for Class II only. The estimate of MSPE for acreage becomes

$$\hat{E}(\hat{A}(S) - A(S))^2 = \underset{\sim}{e}^T \hat{H}_0 \underset{\sim}{e} + \underset{\sim}{X}^T B \underset{\sim}{X} - 2 \underset{\sim}{X} \hat{H}_{01} \underset{\sim}{e}_1 \qquad (35)$$

where again H_0 is the masked matrix containing only the strata in S.

3.4 INPUT FILE DESCRIPTION

Two files, a control card file and a data file, are required for execution of the GOAT program. These are described in section 3.4.1 and 3.4.2.

3.4.1 USER DEFINED CONTROL CARD FILE

(FILENAME) (FILETYPE) (FILEMODE)

The Control Card file specifies the parameters of the data that are inputs to the GOAT program. Each record consists of (1) a "keyword" which begins in column one and is at most 10 characters long and (2) input parameters in columns11 through 80. Numbers in a series must be separated by commas; blanks are optional. Continuation of a series of numbers in a record is indicated by a comma, followed by an ampersand (, &) after the last number on the card image.

The data from this file is used to set the variables in the PARAM COMMON block by the READFL subroutine.

KEYWORD	ACCEPTABLE INPUTS	DESCRIPTION
AREA STRAT	positive number	This record gives the number of acreage or area strata that are included in the data file.
HIST YRS	positive number	The total number of historical years.
HMATRIX YR	positive number	Number of consecutive historical years, starting with the first, that are used for calculating the H matrix.
RATIO YR	positive number	The number of the historical year used for rationing.
GAP	positive number	The number of years gap between the ratio year and the current year.

KEYWORD	ACCEPTABLE INPUTS	DESCRIPTION
OPTION SET	positive number	The number of optional or arbitrary sets (pzones) of acreage strata.
SCALE	positive number	The scale factor for the acreage units. (Optional, default value is 1).
UNITS	free format	Units of area and production for report information (optional).
CROP	free format	Crop type for report information (optional).
JOIN	At least 2 and up to 13 five-digit positive numbers, separated by commas.	List of acreage strata ID's that are eligible to be joined with the first ID in the list. No more than 12 acreage strata may be joined to the first. The numbers are separated by commas.
PZONE	At least 1 and up to 249 five-digit positive numbers, separated by commas.	List of acreage strata ID's in a pseudozone pzone or arbitrary set. No more than 20 pzones (arbitrary sets) are accepted. The numbers are separated by commas.

KEYWORD	ACCEPTABLE INPUTS	DESCRIPTION
COMMENT	free format	This optional record gives any comments for report information.
CHECK OUT	0,2,3,4, or 6	This optional record is used for diagnotic purposes only. (Default value zero). For a description of the output generated by the values of CHECK OUT, see section 3.5.2.
END*	none	This record identifies the end of the user defined records (optional).

An example of a Control Card File follows:

AREA STRAT	12
HIST YRS	7
RATIO YR	6
HMATRIX YR	5
GAP	4
OPTION SET	2
SCALE	1000
UNITS	Acres and bushels
CROP	Spring small grains
JOIN	17001, 18001, 18002
JOIN	17002, 18001, 18002, 18003, 18004, 18005, &
JOIN	19001, 19002

PZONE	17001, 17002, 17003, 18001, 18003
PZONE	18002
COMMENT	Initial test for spring small grains.

3.4.2 DATA FILE

(Filename) (Filetype) (Filemode)

The Data File contains the relevant data for each acreage (or area) stratum. There is a maximum of 250 records, all having the same format.

Format of a record

Columns	Format	Variable Name	Contents
1-5	I5	IDSR	ID of acreage stratum*
6-7	2X		Blank
8-10	I3	IDYLSR	ID of the yield stratum.
11	1X		Blank
12-20	F9.2	DACES	Direct acreage estimate.
21-22	2X		Blank
23-31	F9.1	VDACES	Variance of DACES.
32-33	2X		Blank
34-42	F9.3	TAREA	Total area of acreage stratum.
43	1X		Blank
44-51	F8.3	YLDEST	Yield estimate.
52	1X		Blank
53-59	F7.2	VARTY	Variance of true yield.
60-66	F7.2	VARESY	Variance of estimated yield.
67	1X		Blank
68-157	10(F9.3)	HSACRE	Historical acreages for each historical year (10 years maximum).

*The ID of the acreage stratum has the form xxyyy, where xx is a 2 digit zone ID and yyy is a 3 digit identification for the acreage stratum in that zone. For example, 50101 indicates that stratum 101 is in zone 50.

The following list shows the equivalence between the names used in the data file and FORTRAN routines and the vector notation used in Section 3.3, the technical Software Description, and the report, "Weighted Ratio Estimation for Large Area Crop Production" by Alan H. Feiveson. This list would be useful for comparisons between formulas in the technical description and their implementation in the FORTRAN code.

VECTOR NOTATION	VARIABLE NAME
d	DACES(I)
$\underset{\sim}{\Sigma}$	VDACES(I)
$\underset{\sim}{\eta}$	YLDEST(I)
Ω	VARTY
$T\ (\gamma)$	VARESY
$\underset{\sim}{h}\ \underset{\sim}{h}_1$	HSACRE(I,RATOYR)
$\underset{\sim}{\alpha}_t$	HSACRE(I,t) t=1,2,...,NHSYRS (The number of historical years).
A_i	TAREA(I)

3.5 OUTPUT DESCRIPTION

The GOAT program has standard and optional outputs. These outputs can be placed into a file or sent to the printer, depending on the response of the user to the GOAT EXEC (see section 4).

3.5.1 STANDARD OUTPUT

The standard output consist of three sections. First, an input summary of the control card file is given. This output is generated by the subroutine READFL and is an echo check of the information given in the control file.

The second output section is a data summary of the acreage and yield strata. For each acreage stratum, the following are output:

1) Acreage stratum identifying number.
2) Direct acreage estimate ($\underset{\sim}{d}$ vector).
3) Variance of the direct acreage estimate ($\hat{\sigma}^2$).
4) Coefficient of variation for the direct acreage estimate (in percent).
5) Historical acreage for the ratio year ($\underset{\sim}{h}$ vector).

For the yield strata, the outputs are the yield estimate, variance of the true yield and the variance of the estimated yield. These yield values are given for each acreage stratum showing which acreage strata belong to the yield strata. Also on this yield strata output page, the group indicators for the acreage strata are given.

The third section of the standard output is for the acreage and production estimates. A page of output is given for each zone, for the region and for each selected arbitrary set of strata. Each page of output begins with a list of acreage strata identifying numbers of strata for which estimates are being made. This page of output finishes with six estimated values. The actual estimate is given along with the associated mean squared prediction error and the root mean squared prediction error for both acreage and production.

3.5.2 OPTIONAL OUTPUTS

There are optional outputs available to the user which are accessed by the keyword CHECK OUT in the Control Card File. This variable allows the user to call for additional checks on the input data or for diagnostic checks on the grouping search of the acreage strata. The possible values for CHECK OUT are 2,4,5 or 6. Any other value given for this variable is ignored and results in no additional output. The value of 2 gives additional echo checks of the input data. The subroutine CHECK1 is invoked by subroutine READFL only when the value of 2 is given to CHECK OUT.

The value of 4, 5 or 6 results in diagnostic outputs for the grouping search of the acreage strata described in section 3.3. A value of 4 results in output on the final grouping search. This includes group indexes, gamma estimates for each group, estimated H matrix, and estimated $\underline{X}$ matrix. The value of 5 or 6 adds step-by-step information on the grouping search to the output given by the value of 4. A value of 5 given to CHECK OUT results in abbreviated information for each grouping step. A value of 6 results in detailed information for each step.

3.6 SOFTWARE DESCRIPTION

3.6.1 GOAT (MAIN)

General Purpose

The purpose of GOAT is

(1) To produce minimum variance, unbiased estimates of acreage and production for a country, zones (states), and any arbitrary set of area strata using yield estimates, historical acreage information and direct acreage estimates for each acreage stratum.

(2) To estimate the mean squared prediction error for the acreage and production estimate.

Specific Purpose

The GOAT program is the main driver which calls the subroutines listed below.

Linkages

GOAT calls subroutines READFL, GRPING, PREST, STATS, ZONES, REGION, and ARB.

Interface

Calling sequence:

Not applicable. (GOAT EXEC which loads and executes GOAT is described in section 4).

Calling sequence parameters:

Not applicable.

COMMON Block Variables Used.

See Appendix A for a complete description of the COMMON block variables.

COMMON NAME	ELEMENT POSITION	VARIABLE NAME	INPUT/ OUTPUT
EST			
	1	NGRPS	I

COMMON NAME	ELEMENT POSITION	VARIABLE NAME	INPUT/ OUTPUT
	2	GROUP(250)	I
	3	HMATRX	I

Note, these 3 variables are returned to the main routine from GRPING which sets the values of the respective variable in the EST Common Block.

Local Variables

None.

Input

None.

Output

None.

Flowchart

Not applicable.

Listing

See Appendix B for a compiled listing of GOAT.

3.6.2 SUBROUTINE READFL

Purpose

The purpose of subroutine READFL is to

(1) read the data contained in the Control Card File and set the value of the variables in the PARAM common. For a description of the variables of the Control Card File, see section 3.4.1.

(2) Call the subroutine RDATA to read the data file.

(3) Set the JOIN(I,J) matrix, the ARBSET(I,J) matrix, and the historical acreage vector for the ratio year.

Linkages

READFL is called by GOAT.

READFL calls RDATA. READFL is also calls CHECK1 if CHECK OUT equals 2. For a description of CHECK OUT, see Optional Outputs, section 3.5.2.

READFL uses the function NUMBR.

Interface

Calling sequence:

```
CALL READFL(IERROR)
```

Calling sequence parameters:

Argument	Input/ Output	Description
IERROR	O	Error flag with values
		0 OK
		1 keyword unrecognized.
		2 acreage stratum ID unrecognized in JOIN record.
		3 acreage stratum ID unrecognized in PZONE record.

COMMON Block Variables Used

See Appendix A for a complete description of the COMMON variables.

COMMON NAME	ELEMENT POSITION	VARIABLE NAME	INPUT/ OUTPUT
PARAM			
	1	NAS	0
	2	NHSYRS	0
	3	NYRS1H	0
	4	RATOYR	0
	5	GAP	0
	6	ISCALE(80)	0
	7	IUNITS(80)	0
	8	ICROP(80)	0
	9	JOIN(250,250)	0
	10	NARB	0
	11	ARBSET(20,250)	0
	12	IOUT	0
DATA			
	1	IDSR	I
	11	HRATYR	0

Local Variables

VARIABLE NAME	DESCRIPTION
I	DO-loop index, array variable.
J	DO-loop index, array variable.
LINE	Array to hold characters on control card in columns 11-80.
IJOIN	Array to hold acreage stratum ID's from JOIN statement.

VARIABLE NAME	DESCRIPTION
INDEX	Index of names in DATA statement.
KEYWD	Four character keyword on control card.
KOUNT	Count of the number of numbers on a control card, the value of the function NUMBR.
NAMES	Array containing 15 data names (first 4 characters of keyword).
NUMBR	See function NUMBR.
TEMP1	Temporary variable to hold remaining characters of the control card keyword that are not stored in "KEYWD".
TEMP2	See TEMP1.
INXCOL	Column index to the JOIN matrix.
INXROW	Row index to the JOIN matrix.
LINENO	Counter of the lines in the control card file.
NUMBER	Array temporarily holding the number on a control card record.

Inputs

Unit	Type	Description
4	Disk	Control Card File.

Outputs

Unit	Type	Description
3	Terminal	Error messages.
6	Printer	Summary report of input, error messages.

DESCRIPTION

The subroutine READFL searches the Control Card File for the number of historical years NHSYRS in order to send it to the subroutine RDATA. Then RDATA is called and returns NORECS, the number of data records. (This is used as a check against the number of acreage strata, NAS, reported in the Control Card File.) Through the common block DATA, the subroutine RDATA also supplies READFL with the acreage strata ID's (IDSR) which are used to set the JOIN matrix.

The Control Card File is rewound and READFL processes each input record and sets the variables in the common block PARAM. Each input record is echoed back in a summary report.

For each "JOIN" record, a row of the JOIN matrix is set. In this record, each acreage stratum may be joined to no more than 12 other acreage strata. In other words, a "JOIN" record is limited to no more than 13 acreage strata ID's.

For each "PZONE" (pseudo-zone) record, a row of the ARBSET matrix is set. An arbitrary set or pzone may consists of 1 through 249 acreage strata. READFL will accept no more than 20 pzones.

After the "END*" record or end of the control card file, READFL sets the historical acreage vector for the ratio year, HRATYR. Next, it tests the number of optional or arbitrary sets reported in the Control Card File against the number of pzones counted. If they disagree, the latter is used and a message is issued. READFL checks if the "JOIN" matrix is symmetric, and if it is not, a correction is made with a message. Finally, if "IOUT" has been set to 2, the subroutine CHECK1 is called. (See description in 3.6.7). READFL returns the parameter IERROR to the main routine. If it is non-zero, the program stops. Non-zero values of IERROR are described above under the calling sequence parameters.

Flowchart

See figure 3.6.2.1 for a flowchart of the subroutine READFL.

Listing

See Appendix B for routine listing of READFL.

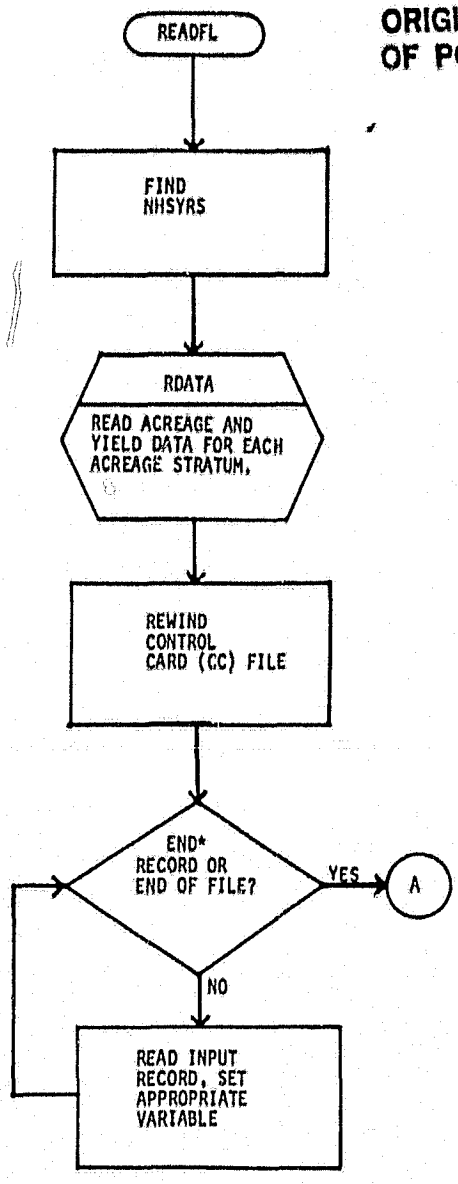


Figure 3.6.2.1 Functional Flowchart of Subroutine READFL

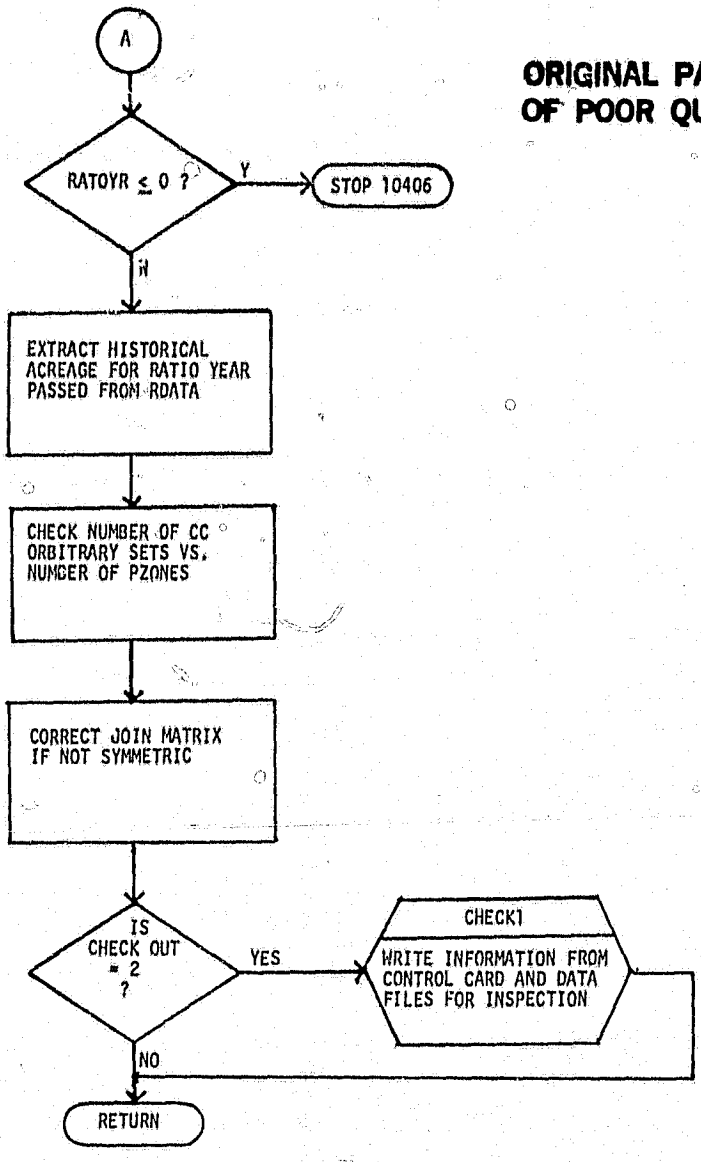


Figure 3.6.2.1 (Continued)

3.6.3 SUBROUTINE RDATA

Purpose

The purpose of subroutine RDATA is to

(1) Read the data file.

(2) Set the vector CLASS1 which indicates whether an acreage stratum has Class 1 data or not.

Linkages

RDATA is called by READFL.
RDATA calls ZSORT.

Interface

Calling sequence:

```
CALL RDATA(NHSYRS,NORECS)
```

Calling sequence parameters:

Argument	Input/ Output	Description
NHSYRS	I	Number of historical years.
NORECS	O	Number of records in data file.

COMMON Block Variables Used

See Appendix A for a complete description of the COMMON block variables.

COMMON NAME	ELEMENT POSITION	VARIABLE USED	INPUT/ OUTPUT
DATA			
	1	IDSR(250)	O
	2	IDYLSR(250)	O
	3	CLASS1(250)	O
	4	DACES(250)	O

COMMON NAME	ELEMENT POSITION	VARIABLE USED	INPUT/ OUTPUT
	5	VDACES(250)	O
	6	TAREA(250)	O
	7	YLDEST(250)	O
	8	VARTY(250)	O
	9	VARESY(250)	O
	10	HSACRE(250,10)	O

Local Variable

None.

Inputs

Unit	Type	Description
5	Disk	Data file.

Outputs

None.

Description

The subroutine RDATA first checks if the number of historical years is nonzero and then proceeds to read each record of the data file. For each acreage stratum with Class I data, the vector CLASSI is set equal to 1. For Class II data, the vector is set equal to 0. (An acreage stratum has Class I data if satellite data has provided a direct acreage estimate.) A count of the number of records is maintained and returned to READFL through the parameter NORECS. If either the variance of the true yield or the variance of the estimated yield is zero, it is reset to a small value (to avoid division by zero in subsequent subroutines.) Letting the variance equal a value close to zero simulates taking the limit of η^T times

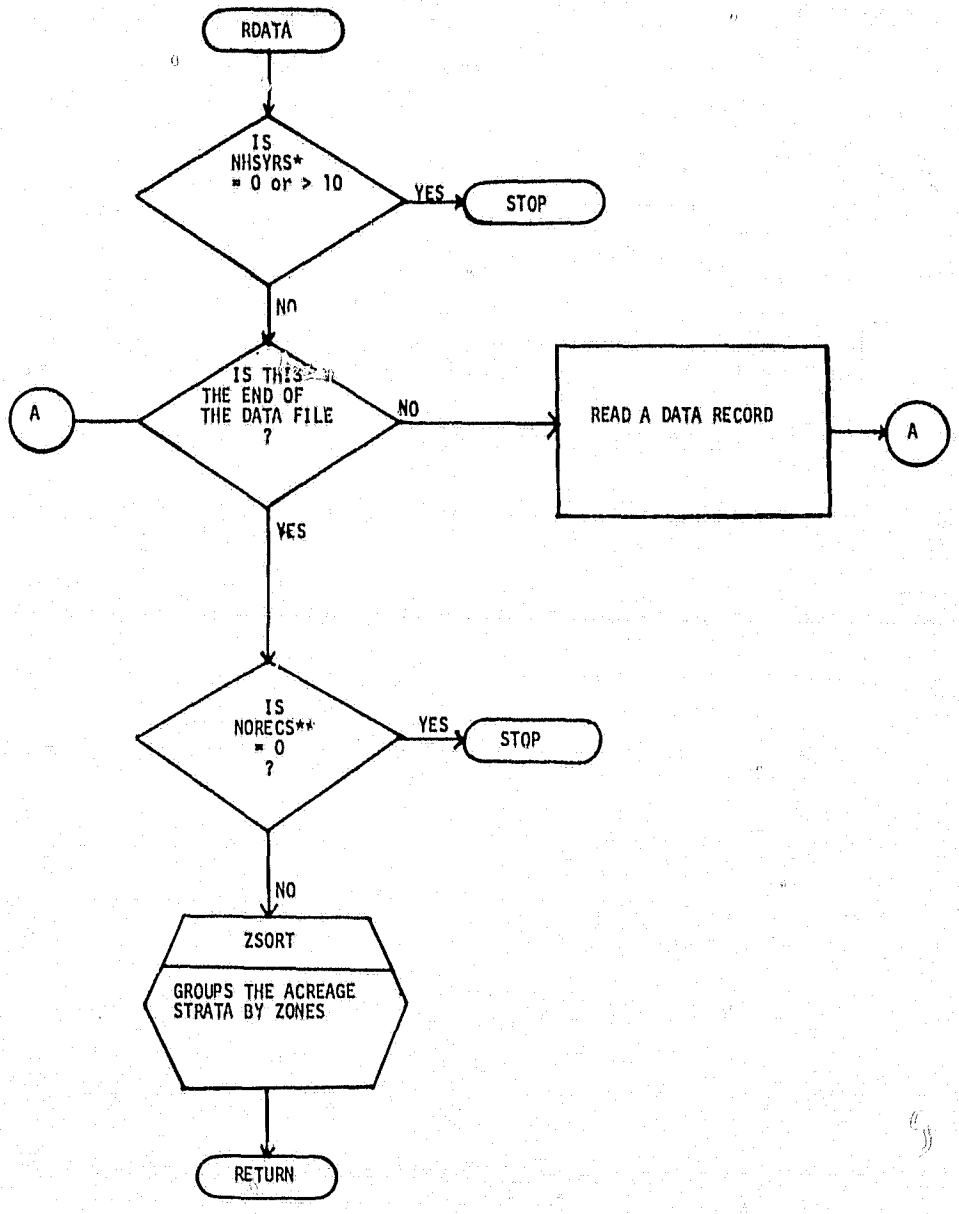
$\overline{X}_0$ (c.f. equation 3.20, Fieyeson) for the production estimate as the variance approaches zero. In this special case the R matrix approaches W and if all the components of the yield vector, η, are set equal to 1, the production equation, $\eta^T \overline{X}_0$ d, reduces to give the optimal acreage estimate.

Flowchart

See figure 3.6.3.1 for a flowchart of the subroutine RDATA.

Listing

See Appendix B for compiled listing of RDATA.



*NHSYRS is the number of historical years.
**NORECS is the number of records.

Figure 3.6.3.1 Functional Flowchart of Subroutine RDATA

3.6.4 SUBROUTINE ZSORT

Purpose

The purpose of subroutine ZSORT is to arrange the records of the data file such that all acreage strata of the same zone are together.

Linkages

ZSORT is called by RDATA.

Interface

Calling sequence:

```
CALL ZSORT(NORECS,NHSYRS)
```

Calling sequence parameters:

Argument	Input/ Output	Description
NORECS	I	Number of records in data file.
NHSYRS	I	Number of historical years.

COMMON Block Variables Used

See Appendix A for a complete description of the COMMON block variables.

COMMON NAME	ELEMENT POSITION	VARIABLE USED	INPUT/ OUTPUT
DATA			
	1	IDSR(25)	I
	2	IDYLSR(250)	I
	3	CLASS1(250)	I
	4	DACES(250)	I
	5	VDACES(250)	I
	6	TAREA(250)	I
	7	YLDEST(250)	I

COMMON NAME	ELEMENT POSITION	VARIABLE USED	INPUT/ OUTPUT
	8	VARTY(250)	I
	9	VARESY(250)	I
	10	HSACRE(250,10)	I

Local Variables

VARIABLE NAME	DESCRIPTION
I	DO-loop counter over acreage strata.
J	DO-loop counter over acreage strata.
ICUR	Pointer to the current zone number.
ICUR1	Pointer to the next zone number.
ITOP	Contains the current zone number.
INEXT	Contains the next zone number.
JMIN	Minimum range number of DO-loop for searching through zone numbers.
ICHECK	Contains the zone number of acreage stratum during DO-loop search.
ISAVEi , i=1,2,3 SAVEn , n=4,...,9	These variables save values of the data records during the exchange of records.
HSAVE(10)	These variables save the historical acreage during the exchange of records.

Inputs

None.

Outputs

None.

Description

During each iteration through the number of acreage strata, zone numbers of consecutive acreage strata, each located with pointers, are compared. The zone number is the first two digits of the acreage stratum ID, IDSR. If these numbers are the equal, the pointers each move down one and the comparison is repeated. If the zone numbers of a pair are different, the second pointer compares the remaining zone numbers with the first or current one of the pair. If an equal zone number is found, the pointer to the current zone number moves down one (to the unequal one) and the data records of the respective pointers are exchanged. The second pointer continues searching for equal zone numbers. When all exchanges are finished, the pointers are incremented by one, and the process begins again until all acreage strata are grouped by zone numbers.

Flowchart

See figure 3.6.4.1 for a flowchart of the subroutine ZSORT.

Listing

See Appendix B for a compiled listing of ZSORT.

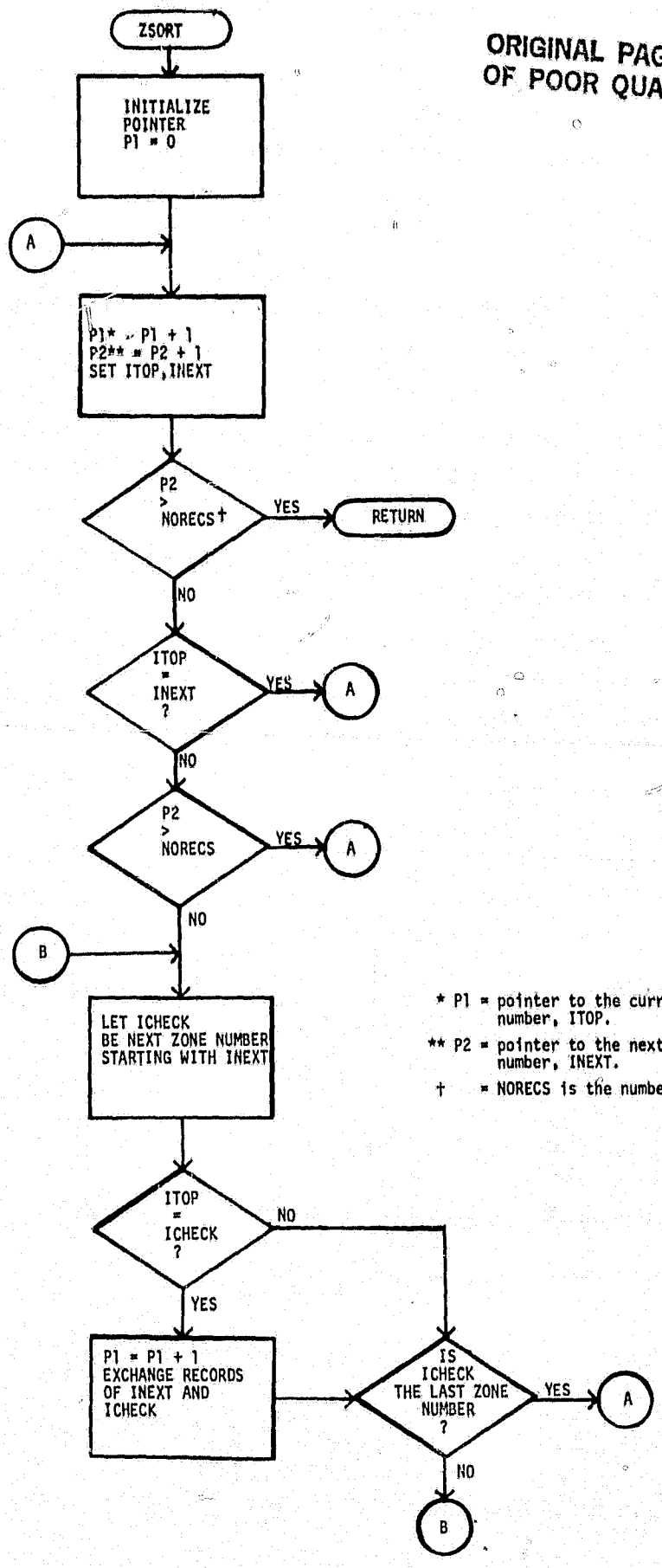


Figure 3.6.4.1 Functional Flowchart of Subroutine ZSORT

3.6.5 FUNCTION NUMBR

Purpose

The function NUMBR counts how many identification numbers are on an inputted line from the Control Card File. The function returns the count as its functional value and the identification numbers are returned in the argument list.

Linkages

Calling sequence:

NUMBR(LINE,NUMVEC)

Calling sequence parameters:

Argument	I/O	Description
LINE(80)	I	Array of characters which is a particular line of the control card file.
NUMVEC(250)	O	Array of identification numbers found in this input line.
NUMBR	O	Count of the total numbers in the array NUMVEC.

COMMON Block Variables Used.

None.

Local Variables

Not applicable.

Inputs

None.

Outputs

None.

Description

The function NUMBR receives an array of characters which represents one line of the Control Card File. This line has been read column-by-column into an integer array (I*4) using an A1 format. Thus, each element of the input array coming to the function contains one character/digit of the particular line of the control card in character format. The character in the integer (i.e.,32 bit word) is left justified. The line of input has 80 characters, but only columns 11 through 80 are used. Columns 1 through 10 are reserved for key words. The function extracts the segment identification numbers from this character string which is contained in the received array. The identification numbers are assumed to be separated by commas.

The subroutine I4A1BN converts the character digit into an integer digit.

The function NUMBR starts to build the identification number from the digits returned from I4A1BN. The function NUMBR starts by searching the received array and skips to the first nonblank character. On finding a nonblank character, the function determines whether or not the character is a digit and calls the subroutine I4A1BN if it is a digit. If the character is not a digit, then the function assigns a number to the output vector NUMVEC and returns. The function continues to search for the next character. If '&' is read, then the function reads the next line of the control card file and reinitiates a search on this new received array. If a ',' is found, then another number is added to the vector NUMVEC and the search of the input line for another identification number continues.

Flowchart

Not applicable.

Listing

See Appendix B for a compiled listing of the function NUMBR.

3.6.6 SUBROUTINE I4A1BN

Purpose

The subroutine I4A1BN takes a numeric digit that has been read in by a character format and converts it to a integer form.

Linkages

I4A1BN is called by the function of NUMBR.

Interface

Calling sequence:

```
CALL I4A1BN(IFLD,NCHFLD,NCVTED)
```

Calling sequence parameters:

Argument	I/O	Description
IFLD(20)	I	The input numeric digit in character form.
NCHFLD	I	The total numeric digits input (set to 1).
NCVTED	O	The character digit in integer form.

Local Variables

Not applicable.

Inputs

None.

Outputs

None.

Description

The subroutine I4A1BN converts the character digit into an integer digit by exchanging bytes around using logical variables. If the input character is not a digit 0 to 9, an error message will be generated.

Flowchart

Not applicable.

Listing

See Appendix B for a compiled listing of I4A1BN.

3.6.7 SUBROUTINE CHECK1

Purpose

Check1 is used as a diagnostic tool to check out information contained in the control card file and some of the information contained in each record of the data file.

Linkages

CHECK1 is called by READFL.

NOTE: READFL only calls CHECK1 if CHECK OUT equals 2 in the Control Card File.

Interface

Calling sequence:

```
IF(IOUT .EQ. 2) CALL CHECK1
```

Calling sequence parameters:

None.

COMMON Block Variables Used

See Appendix A for a complete description of the COMMON block variables.

COMMON NAME	ELEMENT POSITION	VARIABLE NAME	INPUT/ OUTPUT
PARAM			
	1	NAS	I
	2	NHSYRS	I
	3	NYRS1H	I
	4	RATOYR	I
	5	GAP	I
	6	ISCALE	I
	7	IUNITS(80)	I
	8	ICROP(80)	I

COMMON NAME	ELEMENT POSITION	VARIABLE NAME	INPUT/ OUTPUT
	9	JOIN(250,250)	I
	10	NARB	I
	11	ARBSET(20,250)	I
	12	IOUT	I
DATA			
	1	IDSR(250)	I
	4	DACES(250)	I
	7	YLDEST(250)	I
	10	HSACRE(250,10)	I

Local Variables

VARIABLE NAME	DESCRIPTION
IAS	DO-loop index for the acreage strata.
J	DO-loop index for columns of JOIN and ARBSET matrices.

Inputs

None.

Outputs

Unit	Type	Description
6	Disk or Printer	Control Card File variables Data file values.

Description

From the Control Card File, CHECK1 writes the crop type and the units for acreage and production and writes variables from the control card file and data file. (A complete list is given previously under Common Variables used.) It also prints the JOIN and ARBSET matrices.

Flowchart

Not applicable.

Listing

See Appendix B.

3.6.8 SUBROUTINE GRPING

Purpose

The purpose of subroutine GRPING is to group the acreage strata in such a manner that the variance of combined acreage strata group is less than the sum of the individual variances.

Linkages

GRPING is called by GOAT.
GRPING calls AVOPT and FIND2.

Interface

Calling sequence:

CALL GRPING (NGRPS,GROUP,HMATRX)

Calling sequence parameters:

Argument	Input/ Output	Description
NGRPS	O	The number of groups.
GROUP	O	Vector containing the group number for each acreage stratum.
HMATRX	O	The H-matrix or the diagonal dispersion matrix containing the variance of the error term in the proportionality model (see equation 1, section 3.3).

COMMON Block Variables Used

See Appendix A for a complete description of the COMMON block variables.

COMMON NAME	ELEMENT POSITION	VARIABLE NAME	INPUT/ OUTPUT
PARAM			
	1	NAS	I

COMMON NAME	ELEMENT POSITION	VARIABLE NAME	INPUT/ OUTPUT
	9	JOIN(250,250)	I
	12	IOUT	I
DATA			
	1	IDSR(250)	I
	3	CLASS1(250)	I
	5	VDACES(250)	I
	11	HRATYR(250)	I

Local Variable

VARIABLE NAME	DESCRIPTION
I,J	DO-loop index for array variable.
I1,J1	DO-loop index for array variable.
IAS	Index of the acreage strata.
NHX	The number of acreage strata in the combined group corresponding to the current maximum variance ratio.
HMAT	H-matrix restricted to acreage strata in current group.
HMIN	The minimum historical acreage in the ratio year.
IDEL	Index of acreage strata/group being absorbed by the INEW group. Quantities related to the IDEL-acreage strata are being deleted or set to zero.
IGRP	The I-th group, IGRP, designates the active group with the minimum historical acreage.
IMIN	The index of the acreage strata/group having minimum historical acreage (IGRP = GROUP(IMIN)).
INEW	The index of the Class I acreage strata/group that is retained. The INEW-group absorbs IDEL group.
IOUT	Flag for signaling diagnostic output.

VARIABLE NAME	DESCRIPTION
ISET	Vector of absolute indices for acreage strata in the current group.
JGRP	The J-th group designates the Class I group being considered for combination with IGRP, the I-th group.
LINE	Data statement containing four underline symbols.
NSET	Number of acreage strata in the potential group which is formed from the two groups IGRP and JGRP. The group's variance ratio has not yet been determined to be the maximum.
GROUP	Vector containing the group number for each acreage stratum.
HTEST	Primary vector used to group acreage strata. For each acreage stratum I, HTEST(I) contains the historical acreage in the historical ratio year.
ILINE	Index used for underlining which is in a data statement.
INDEX	Holds the group number of an acreage stratum that is a group indicator (i.e., it has activity value 2).
INDHX	Vector of absolute acreage strata indices in current group to be used for the H-matrix.
ITEMP	DO-Loop index through current group which may be temporary depending on succeeding variance ratios.
NUMII	Number of Class II acreage strata.
RATIO	Ratio of VOPTJ, variance of a Class I acreage strata/group or VOPTI + VOPTJ, sum of the variances of 2 Class I acreage strata to VOPTIJ, the variance of the combined group.
SFLAG	Flag to check if all acreage strata have been grouped.

VARIABLE NAME	DESCRIPTION
SLINE	Data statement containing four * symbols for star-lines.
VOPTI	The acreage mean square prediction error, MSPE, for the I-th group, IGRP (optimal variance I-th group).
VOPTJ	The acreage mean squared prediction error, MSPE, for the J-th group, the Class I group that may be joined to the I-th group (optimal variance J-th group).
VTEMP	Temporary variable holding the acreage MSPE for the group resulting from combining the I and J-th groups. This variance is temporary until the maximum value of RATIO is found.
ACTIVE	Vector that maintains the status of each acreage stratum during the grouping process. Active's values and their meanings are:

ACTIVE VALUE	DESCRIPTION
1	Initial setting that activates all acreage strata. All strata with this setting will be considered further in the grouping algorithm.
2	Setting for an acreage stratum with maximum historical acreage but one not eligible to be joined to any other acreage strata group or one that gives a RATIO value ≤ 1.
3	Setting for the IDEL acreage strata group that is being absorbed in the INEW group.
8	Setting for a Class II acreage stratum that has been considered but for which no eligible Class I stratum could be combined at the current state of the grouping algorithm.
9	Setting for a Class II acreage strata that has been combined with a Class I group.

VARIABLE NAME	DESCRIPTION
CLASS1	For each Class I acreage strata, the Class I vector has value 1. For Class II strata the value is zero.
GAMSPE	The mean squared prediction error for acreage of a group.
HMATRX	The H-matrix or the diagonal dispersion matrix containing the variance of the error term in the proportionality model (see equation 1, section 3.3, or equation 2.1, Weighted Ratio Estimation for AgRISTARS, Fieveson).
HXTEMP	Vector temporarily saving the H-matrix values calculated for the current group.
ISOLAT	Number of isolated Class II acreage strata.
JFIRST	The first acreage stratum which is eligible to be joined to the minimum historical acreage strata/group, the IMIN stratum.
JOINIM	Index of the Class I acreage stratum that will be joined to the IMIN stratum.
RATMAX	The maximum value of RATIO.
VOPTIJ	The mean squared prediction error MSPE (or optimal variance) of the group resulting from the union of the I-th group, IGRP and the J-th group, JGRP.

Inputs

None.

Output

Unit	Types	Description
6	Disk	Check out data.

Description

The subroutine GRPING groups acreage strata based on the estimate of the acreage variance for the group. The subroutine is divided into two parts to deal first with Class II acreage strata and then the remaining Class I strata. A class I acreage stratum is one for which a direct estimate based on satellite data has been given. A Class II stratum has no direct estimate.

At the beginning of the routine each acreage stratum is "activated" and is initialized to be a group by itself, the diagonal H matrix is set to zero, and the mean squared prediction error (MSPE) for group acreage simplifies to the variance of the direct estimate for Class I strata.

If there are any Class II acreage strata then the one with the minimum historical acreage value in the ratio year (RATOYR) is chosen to be grouped with some Class I acreage stratum. If there are none initially or no active Class II strata remain after previous grouping attempts, the program checks that each Class II stratum has been combined with at least one class II stratum. Then, either it stops if there is an isolated Class II stratum or proceeds to the second part, the Class I grouping.

Using the JOIN matrix the program checks if any Class I acreage stratum is eligible to be joined with the minimum acreage Class II stratum. If none is eligible, the program returns to the remaining Class II strata and finds the stratum with the next largest minimum historical acreage value. If some Class I stratum group is eligible to be joined, the program determines the maximum value of

RATIO = VOPTJ / VOPTIJ

where VOPTJ is the acreage mean squared prediction error (MSPE) for the class I group and VOPTIJ is acreage MSPE of the group formed by combining the Class I and Class II strata. Also the elements of the H matrix for this combined group are returned from the subroutine AVOPT and stored temporarily.

Next, several variables are changed to reflect a grouping in which the Class II stratum is essentially absorbed into a class I group. The Class II stratum is assigned the same group number as the Class I group. The two historical acreages for the ratio year are added and the result is stored in the HTEST vector where the Class I acreage was stored and the position in HTEST storing the Class II acreage is set to zero. Since this Class II stratum has been absorbed in a Class I group, it is excluded from further active consideration and the number of isolated Class II's is decreased. With the new grouping the JOIN matrix is changed so that the row and column for the Class II stratum are all zeros and the row and column of the new group are changed to reflect the addition of the Class II stratum to the Class I group. The matrix is also kept symmetric. Also the elements of the H matrix corresponding to the absolute acreage stratum index (versus the sequential index in group) are stored. The program reactivates Class II strata that were considered but not eligible to be combined with any Class I stratum at that time. The program repeats the process of grouping the next active, Class II acreage stratum with minimum acreage.

When every Class II acreage stratum has been combined with a Class I group, the program proceeds to the second part, the Class I search. Here, also, the active stratum with minimum historical acreage is found. It is designated as the IMIN stratum and IGRP group. If there are no active strata, the grouping is complete and the subroutine returns the grouping, H matrix and number of groups to the main routine. Assuming the active Class I stratum with minimum historical acreage has been found, the JOIN matrix is checked to see if any acreage strata/group is eligible to be joined with it. If not, this stratum is deactivated and the one with the next largest historical acreage value among the active strata is located. Proceeding through the acreage strata/groups that are eligible to be joined to IGRP, the program determines the maximum value of

$$RATIO = (VOPTI + VOPTJ) / VOPTIJ$$

where VOPTI is the acreage MSPE for the group IGRP, VOPTJ is the acreage MSPE for the acreage strata/group which is eligible to be joined with IGRP, and VOPTIJ is the acreage MSPE for the combined group.

If the value of RATIO is less than 1.0, the grouping is rejected since the combined variance is more than the sum of the two individual variances. If this happens, the IGRP group is deactivated and the program returns to find the next largest minimum historical acreage group.

When two acreage strata/groups are combined, several variables are changed as in part I to reflect this. Essentially, the acreage strata/group with minimum acreage absorbs the other one and values such as its group number, HTEST, and the JOIN matrix are set accordingly. Any deactivated Class I strata with active value 2 are reactivated to 1 and the procedure returns to the beginning of the Class I search.

The grouping procedure ends when all the strata have been deactivated so that a IMIN stratum cannot be found. This happens when (1) RATIO is less than 1 which causes the IMIN stratum to be deactivated to value 2 and a return to the beginning of the Class I search (which searches only active Class I strata) or (2) no acreage strata/group is eligible to be joined to the IMIN stratum which results in deactivating it to value 2 and returning to the beginning of the Class 1 search. The acreage strata are checked to see if all Class II strata have been deactivated to 9 and if all Class I strata have been deactivated to 2 or 3. (An absorbed Class I stratum is deactivated to value 3).

Finally, the group numbers are changed so they are sequential and the number of groups is counted. Control returns to the main routine.

Flowchart

See figure 3.6.8.1 for a flowchart of the GRPING subroutine.

Listing

See Appendix B for compiled listing of RDATA.

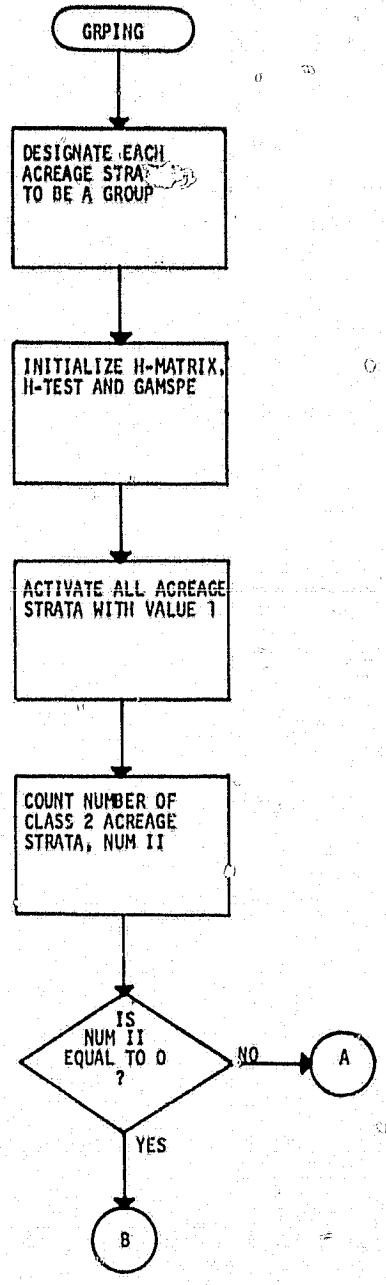


Figure 3.6.8.1 Functional Flowchart of Subroutine GRPING

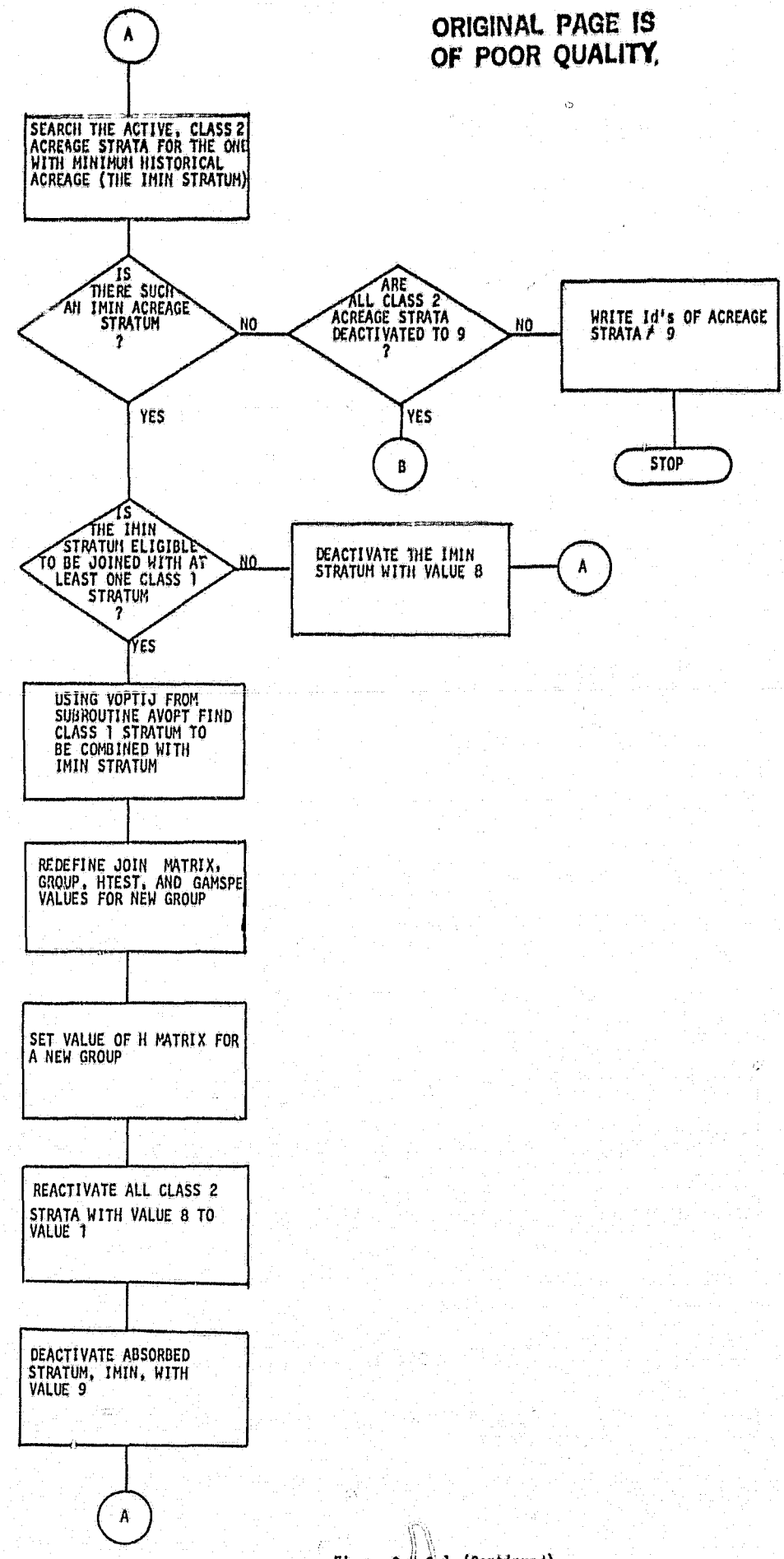


Figure 3.(1.8).1 (Continued)

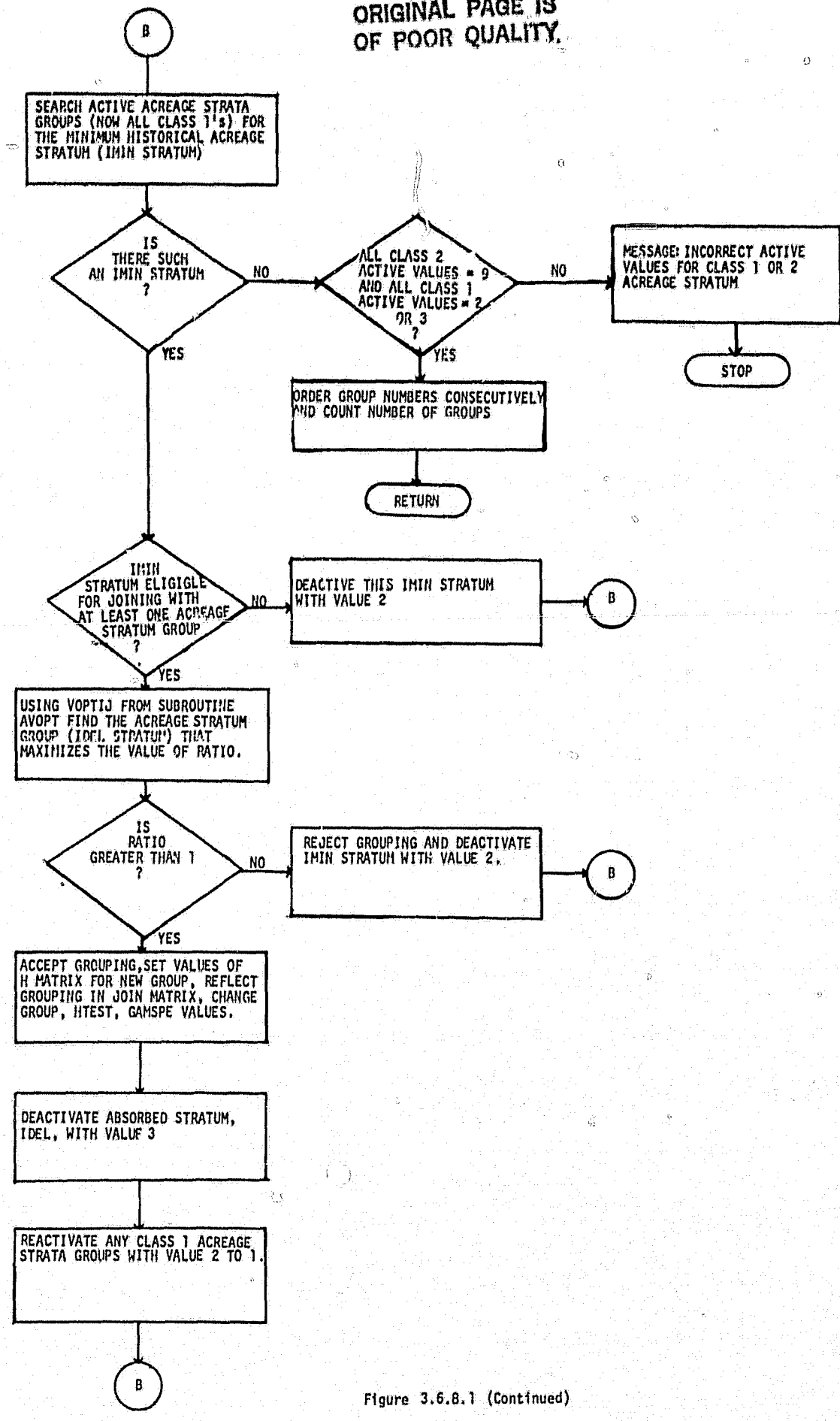


Figure 3.6.8.1 (Continued)

3.6.9 SUBROUTINE FIND2

Purpose

Subroutine FIND2 finds the indexes of the acreage strata belonging to two groups that are being considered for merging. It also finds the number of acreage strata in the new group.

Linkages

FIND2 is called by GRPING.

Interface

Calling sequence:

```
CALL FIND2(GRP1,GRP2,GROUP,NAS,NSET,ISET).
```

Calling sequence parameters:

Argument	Input/ Output	Description
GRP1	I	Group number of the first group (group with minimum historical acreage).
GRP2	I	Group number of the second group possibly being joined to GRP1.
GROUP	I	Vector containing group number of each acreage stratum.
NAS	I	Number of acreage strata.
NSET	O	Total number of acreage strata in the new group.
ISET	O	Vector containing the absolute acreage strata indexes for the new group.

COMMON Block Variables Used

None.

Local Variables

None.

Inputs

None.

Ouputs

Unit	Type	Description
6	Printer	Warning message of group with no members.

Description

While running through the acreage strata by indexes from 1 to NAS, the program compares the group number of the current acreage stratum with either of the group numbers GRP1 or GRP2. If they agree, the index is placed in ISET, and NSET is incremented by one. The subroutine checks the final value of NSET and prints a warning if it equals zero.

Flowchart

Not applicable.

Listing

See Appendix B for a compiled listing of FIND2.

3.6.10 SUBROUTINE AVOPT

Purpose

The subroutine AVOPT calculates the mean squared prediction error of the acreage estimate and the variance matrix for a given set of acreage strata.

Linkages

AVOPT is called by the subroutine GRPING.

AVOPT calls the subroutine HGAMMA.

Interface

Calling sequence:

```
CALL AVOPT(NSET,ISET,VOPT,HMAT)
```

Calling sequence parameters:

Argument	I/O	Description
NSET	I	Total number of acreage strata in the input set of acreage strata.
ISET(NSET)	I	Sequential indexes for the acreage strata.
VOPT	O	The acreage mean squared prediction error for this set.
HMAT(NSET)	O	The variance matrix associated with this set of acreage strata.

COMMON Block Variables Used

See Appendix A for a complete description of the COMMON blocks.

COMMON NAME	ELEMENT POSITION	VARIABLE NAME	I/O
PARAM			
	3	NYRS1H	I
	5	GAP	I
	12	IOUT	I
DATA			
	3	CLASS1(250)	I
	4	DACES(250)	I
	5	VDACES(250)	I
	6	TAREA(250)	I
	10	HSACRE(250,10)	I
	11	HRATYR(250)	I

Local Variables

VARIABLE NAME	DESCRIPTION
B1	Intermediate calculation for H matrix.
B2	Intermediate calculation for H matrix.
D2	Intermediate calculation for H matrix.
EP	Intermediate calculation for H matrix.
T2	Intermediate calculation for H matrix.
X1	Intermediate calculation for H matrix.
BD1	Component 1 of the mean square prediction error (MSPE) of the acreage estimate.
BD2	Component 2 of MSPE of the acreage estimate.
BD3	Component 3 of MSPE of the acreage estimate.
BOT	Summation of the historical acreage for the Class 1 acreage strata of the given set.
EHE	Summation of the elements in the H matrix.
GX1	Intermediate calculation for H matrix.
IAS	Acreage strata indexes given in ISET.
TOP	Sum of direct acreage estimates (Class 1) for the given set of acreage strata.
CGAM	Gamma ratio for the current year.

VARIABLE NAME	DESCRIPTION
EHIS	Summation of all the historical crop acreage for the given set.
CGAMK	Gamma for the current year raised to the K(GAP) power.
KYEAR	Indexing of the historical acreage years of data.
KYRM1	KYEAR minus 1, the lag year.
THETA	Intermediate calculation for the H matrix.
BMATRX	Intermediate calculation for the H matrix.
HISGAM(10)	An array of the historical gammas returned from the subroutine HGAMMA.

Inputs

None.

Outputs

Unit	Type	Description
6	Printer	Possible errors, and optional output (CHECK OUT).

Description

The subroutine begins by calling the subroutine HGAMMA to obtain the historical acreage ratios. The subroutine AVOPT then continues by using these ratios to calculate the acreage variance matrix. Using values in the DATA common blocks and this variance matrix, the subroutine finds subcomponents to calculate the mean squared prediction of the acreage estimate. The subroutine finishes with a check on the subcomponents found. If the checks fails, an error message is printed out and the GOAT procedure continues.

Flowchart

See figure 3.6.10.1 for a functional flowchart of the subroutine AVOPT.

Listing

See Appendix B for compiled listing of AVOPT.

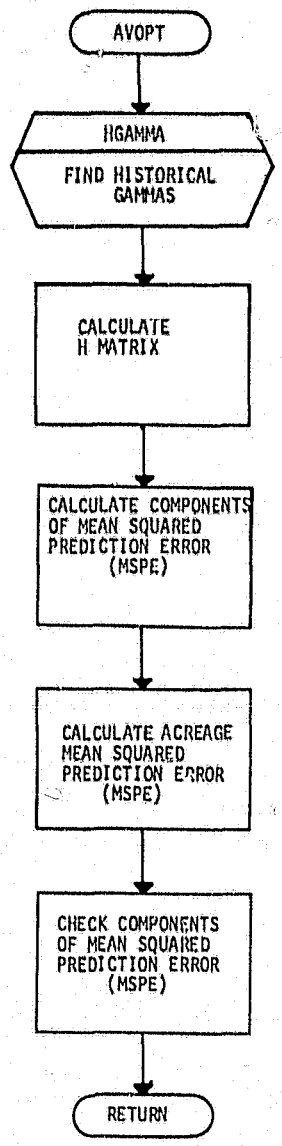


Figure 3.6.10.1 Functional Flowchart of Subroutine AVOPT.

3.6.11 SUBROUTINE HGAMMA

Purpose

The subroutine HGAMMA calculates the γ_t, the historical acreage ratios, for the historical years that are used in calculating the H matrix.

Linkages

HGAMMA is called by the subroutine AVOPT.

Interface

Calling sequence:

```
CALL HGAMMA(NSET,ISET,HISGAM)
```

Calling sequence parameters:

Argument	I/O	Description
NSET	I	Number of acreage strata in the potential group which may be formed from IGRP and JGRP in GRPING subroutine.
ISET(NSET)	I	Vector containing acreage strata indices for potential new group.
HISGAM(10)	O	The historical gammas that are calculated in this subroutine.

COMMON Block Variables Used

See Appendix A for a complete description of the COMMON block variables.

COMMON NAME	ELEMENT POSITION	VARIABLE USED	INPUT/ OUTPUT
PARAM			
	1	NAS	I
	3	NYRS1H	I

COMMON NAME	ELEMENT POSITION	VARIABLE USED	INPUT/ OUTPUT
DATA			
	6	TAREA(250)	I
	10	HSACRE(250,10)	I

Local Variables

VARIABLE NAME	DESCRIPTION
E	Intermediate value used to compute SUM1 and SUM2.
H	Crop acreage proportion in (K-1)-st year. This intermediate value is used to compute SUM1 and SUM2.
I	DO-loop index.
W	Intermediate value used to compute SUM1 and SUM2.
XD	Sum of the historical crop acreage proportions in K-th year over the acreage strata in the group. This value is used to calculate DEM and DELTA.
BOT	Bottom or denominator in the ratio for the starting value of Newton's iteration for GAMMA. It is the sum of the historical acreages in the previous year or (K-1)-th year with respect to the current year (K-th year).
IAS	Index of acreage strata.
TOP	TOP or numerator in the ratio for the starting value of Newton's iteration for GAMMA.
GMAX	Maximum allowable value for gamma.
LEFT	The left hand side of implicit equation for γ. Equation 5 section 3.3 or see equation 4.19, "Weighted Ratio Estimation of Large Area Crop Production", Fieveson.

VARIABLE NAME	DESCRIPTION
SUM1	Component in the numerator of DELTA. Intermediate calculation in Newton's iteration.
SUM2	Component in the denominator of DELTA. Intermediate calculation in Newton's iteration.
DELTA	DELTA is the change in the approximation for gamma in each iteration of Newton's method. That is, it corresponds to - f(x)/f'(x) in the iteration scheme.
HPMAX	Maximum value of HISPRO over acreage strata referenced by the vector ISET.
KYEAR	Index of the historical years, from 2 to NYRS1H. Also index of the gammas.
KYRM1	K-th year minus one, i.e., the year preceeding the K-th year.
NITER	Number of iterations.
RIGHT	Right hand side of implicit equation for γ. See "LEFT" above for reference.
HISGAM	Vector containing the historical gammas for the years 2,3..., NYRS1H.
HISPRO	The historical proportion of crop acreages, i.e., historical acreage divided by total acreage for a stratum.
NITMAX	Maximum number of iterations of Newton's method.
RELDEL	Relative delta, i.e., the ratio of DELTA, the change in gamma, to HISGAM.

Inputs

None.

Outputs

None.

Description

The subroutine is designed to calculate the historical gammas for the years 2,3,..., NYRS1H. The essential feature of the subroutine is an application of Newton's method to solve the implicit equation for gamma. (Equation 5 of section 3.3).

The gammas are the proportionality constants used in the equation

$$a_t = \gamma_t \, a_{t-1} + \varepsilon_t$$

where a_t is an nx1 vector of stratum crop acreages in the year t and ε_t is a random vector. An approximate starting value of γ_t, needed for Newton's method, is obtained from

$$\sum_{i=1}^{n} d_i \; / \; \sum_{i=1}^{n} h_i$$

where h_i are the historical crop acreages in the (k-1) st year and d_i are the historical crop acreages in the k-th year (or d_i are the direct acreage estimates in the current year) for the n acreage strata in the potential group under consideration.

For each of the k years, k=2,..., NYRS1H, the program computes the starting value of gamma. When equation 5, Section 3.3 is modified to the form $f(\gamma) = 0$, it is feasible to apply Newton's method to approximate γ. First, necessary components for the method are computed and then the successive approximations to γ are computed by the formula

$$\gamma_i = \gamma_{i-1} - \frac{f(\gamma_{i-1})}{f'(\gamma_{i-1})} \quad , \quad i = 1,2,...$$

where f' denotes the first derivative of f. The program continues this iteration until either

$$\left| \frac{f(\gamma_{i-1}) \; / \; f'(\gamma_{i-1})}{\gamma_{i-1}} \right| < .00001$$

or the number of iterations exceeds NITMAX which has been set to 26. In the latter case, the last computed estimate of γ is saved in HISGAM.

A final adjustment is made on the values found for gamma. If the value of gamma is less than .005, then the value is reset to .005, and if it is greater than GMAX, it is reset to GMAX. (GMAX = .995 / $\underset{i}{\text{MAX}}$ (p_i) , where p_i is the historical crop acreage proportion for the i-th acreage stratum in a group).

Finally, it is determined if each γ satisfies equation 5, Section 3.3 to within 4 significant decimal places. The subroutine returns control to the main routine after the NYRS1H-1 gammas have been computed.

Flowchart

See figure 3.6.11.1 for a flowchart of the subroutine HGAMMA.

Listing

See Appendix B for a compiled listing of HGAMMA.

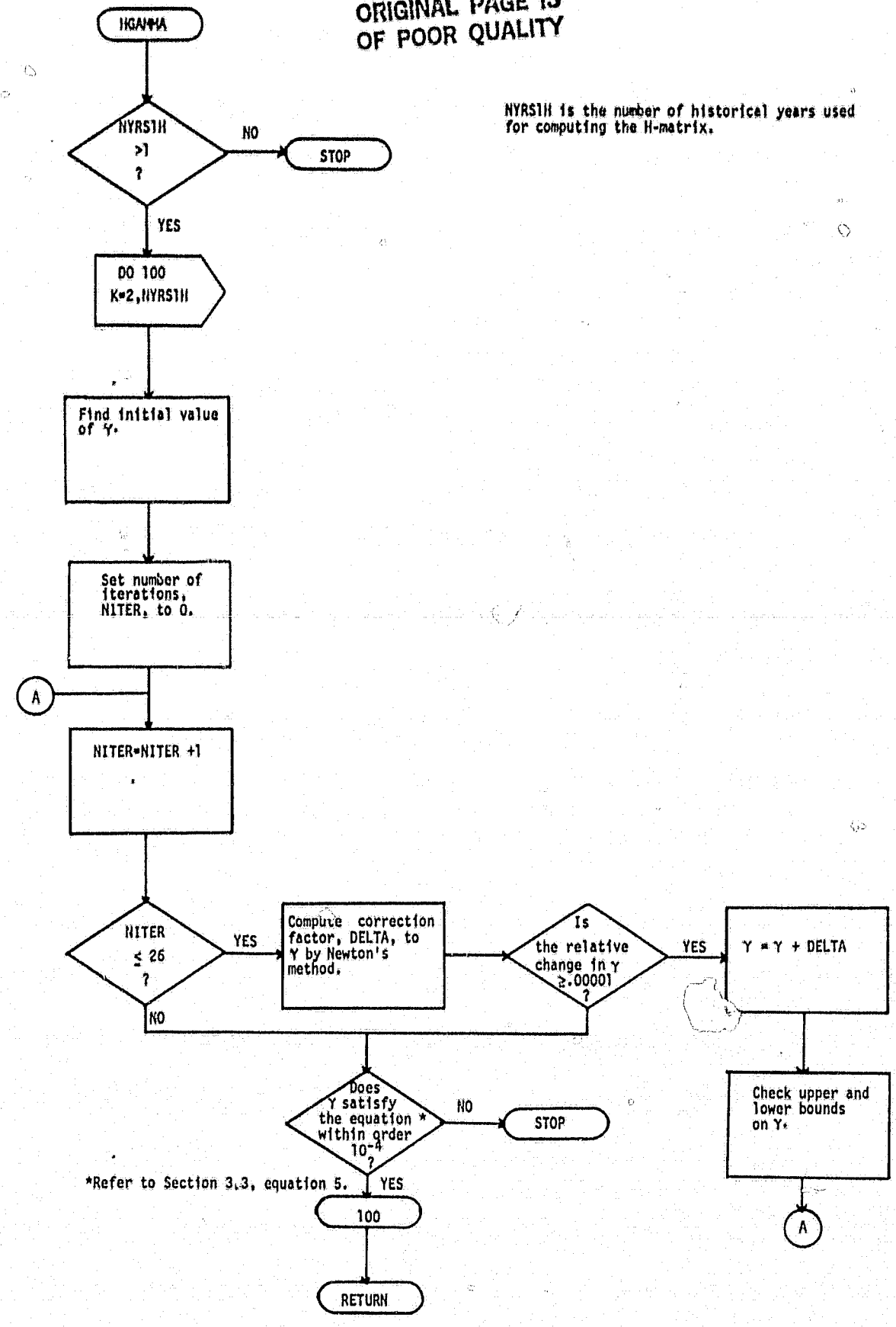


Figure 3.6.11.1 Functional Flowchart for Subroutine HGAMMA

3.6.12 SUBROUTINE PREST

Purpose

The subroutine PREST calculates variables needed in the estimation step of the GOAT procedure. The main variable calculated is the $\underline{X}$ matrix. Other variables found are the B matrix and indexes between the acreage and yield strata.

Linkages

PREST is called by the GOAT main program.

Interface

Calling sequence:

```
CALL PREST
```

COMMON Block Variables Used:

See Appendix A for a complete description of the COMMON blocks.

COMMON NAME	ELEMENT POSITION	VARIABLE NAME	INPUT/ OUTPUT
PARM			
	1	NAS	I
	12	IOUT	I
DATA			
	1	IDSR(250)	I
	2	IDYLSR(250)	I
	3	CLASS1(250)	I
	4	DACES(250)	I
	5	VDACES(250)	I
	7	YLDEST(250)	I
	9	VARESY(250)	I
	11	HRATYR(250)	I

COMMON NAME	ELEMENT POSITION	VARIABLE NAME	INPUT/ OUTPUT
EST			
	1	NGRPS	I
	2	GROUP(250)	I
	3	HMATRX(250)	I
	4	BMATRX(250)	0
	5	GAMMA(250)	0
	6	XMATRX(250,250)	0
	7	XOC1(250)	0
	8	NUMYS	0
	9	IYDSEQ(50)	0
	10	IYDSEQ(50)	0
	11	IYD(250)	0
	12	XD(250)	0

Local Variables

VARIABLE NAME	DESCRIPTION
BOT	Summation of the historical acreages for the Class I strata of the ratio year.
HBH	Summation for the Class I strata for the historical acreage squared, divided by corresponding value of the B matrix (h_1 B^{-1} h_1).
NUH(250)	Intermediate value for the R matrix, summation of yield estimate multiplied by the H matrix for the Class I.
TOP	Summation of the Class I direct acreage estimates.
GVEC(250)	Intermediate vector for calculating the R matrix, equation 18, section 3.3.

VARIABLE NAME	DESCRIPTION
RBIH(50)	Intermediate vector for calculating the $\underset{\sim}{X}$ matrix.
CHECK	The value used in checking whether the i^{th} element of $\underset{\sim}{X}\,\underset{\sim}{h}_1$ is equal to $\underset{\sim}{h}$.
IPAGE	An index number for printing the $\underset{\sim}{X}$ matrix.
UPUTN(250)	Intermediate vector for calculating the g vector of equation 18, section 3.3.
GRPGAM	The estimate for gamma of a group.
INGAYS(50)	A count of the number of acreage strata belonging to the intersection of a group and a yield stratum. The count is given for each yield stratum.
IYIELD	An index for the NUMYS yield strata.
KGROUP	An index for the NGRS group of acreage strata.
ONEPNG	A constant value for calculating the R matrix.
RMATRX(50,50)	The R matrix of equation 17, section 3.3.
XMATH1(250)	Vector of values found in the multiplication of the $\underset{\sim}{X}$ matrix and the $\underset{\sim}{h}_1$ vector. Used to check whether $\underset{\sim}{X}\,\underset{\sim}{h}_1 = \underset{\sim}{h}$.

Inputs

None.

Outputs

Unit	Type	Description
6	Printer	Possible errors and optional output.

Description

The first variable assigned in this subroutine is the B matrix. This is a simple addition of the input matrix VDACES and the computed matrix HMATRX from the grouping step. Next, the number of unique yield strata is counted and a separate vector containing their identifying indexes is created. A vector of numbers pointing to the first acreage stratum for each yield stratum is found. In order to index the yield strata sequentially, a vector of sequential numbers for the unique yield strata identifying numbers is created. The $\underline{X}$ matrix is calculated next using the grouping of the acreage strata. That is equations 18, 17 and then 16, section 3.3, are applied to each group until the $\underline{X}$ matix is filled. At the end of this loop which built the $\underline{X}$ matrix, the estimate for gamma for the group is found by applying equation 11, section 3.3, and is assigned to each acreage stratum in the group. After the $\underline{X}$ matrix is obtained, the intermediate vector of values used for the acreage and production estimates, $\underline{X}\,\underset{\sim}{d}$, is found ($\underset{\sim}{d}$ is the vector of direct acreage estimages). Next, the restriction on the $\underline{X}$ matrix to have an unbiased production estimate is checked. This is done by checking the individual elements of equation 15, section 3.3, and, for unequal elements, writing out an error message. The PREST subroutine completes processing by writing optional output if the user specifies it in the Control Card File.

Flowchart

See figure 3.6.12.1 for a functional flowchart of the subroutine PREST.

Listing

See Appendix B for a compiled listing of PREST.

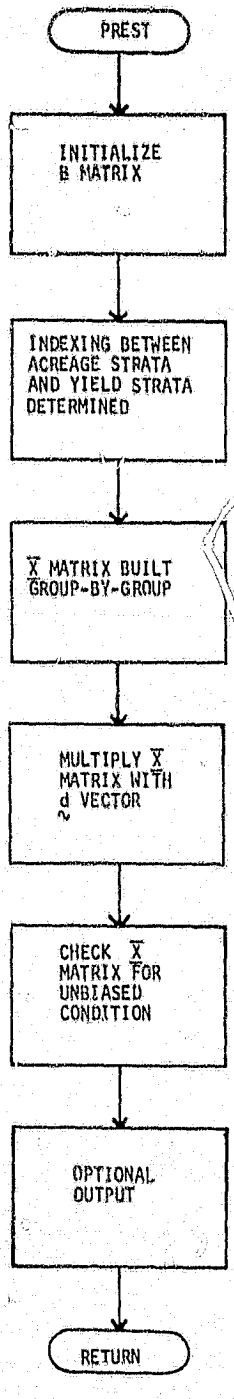


Figure 3.6.12.1 Functional Flowchart of Subroutine PREST.

3.6.13 SUBROUTINE STATS

Purpose

The purpose of subroutine STATS is to print a summary of the input data and the results of the grouping algorithm.

Linkages

STATS is called by GOAT.

Interface

Calling sequence:

CALL STATS

Calling sequence parameters:

None.

COMMON Block Variables Used

See Appendix A for a complete description of the COMMON block variables.

COMMON NAME	ELEMENT POSITION	VARIABLE NAME	INPUT/ OUTPUT
PARAM			
	1	NAS(250)	I
	7	IUNITS(80)	I
	8	ICROP(80)	I
DATA			
	1	IDSR(250)	I
	2	IDYLSR(250)	I
	3	CLASS1(250)	I
	4	DACES(250)	I
	5	VDACES(250)	I
	7	YLDEST(250)	I

COMMON NAME	ELEMENT POSITION	VARIABLE NAME	INPUT/ OUTPUT
	8	VARTY(250)	I
	9	VARESY(250)	I
	11	HRATYR(250)	I
EST			
	2	GROUP(250)	I

Local Variables

VARIABLE NAME	DESCRIPTION
CVDACE	Coefficient of variation of the direct acreage estimate.

Inputs

None.

Outputs

Unit	Type	Description
6	Disk and/or Printer	Summary Data or Grouping.

Description

If an acreage stratum is Class I, the coefficient of variation of the direct acreage estimate is calculated. If the acreage stratum is Class II, the coefficient of variation is zero.

First, user information concerning the crop type and units of area and production are printed. A scale factor is available, but since no scaling of the data occurs, it is skipped. This option is included for flexibility if future refinements call for rescaling the input data.

The first part of the data summary is printed. For each acreage stratum, this includes the acreage (area) stratum ID, direct acreage estimate, variance of the direct acreage estimate, coefficient of variation, and the historical area for the ratio year. For each acreage stratum, the second part of the summary includes the acreage (area) stratum ID, the yield stratum ID, yield estimate, variance of the true yield, variance of the estimated yield, and the group to which the acreage stratum is assigned.

Flowchart

Not applicable.

Listing

See Appendix B for a compiled listing of STATS.

3.6.14 SUBROUTINE ZONEST

Purpose

The purpose of the subroutine ZONEST is to

(1) Set the IMASK vector to indicate the acreage strata for each zone.

(2) Supply IMASK to the subroutine EST2 for the calculation of acreage and production estimates and their respective mean squared prediction errors (MSPE).

(3) Print the acreage and production estimates and the respective MSPE and Root MSPE.

Linkages

ZONEST is called by GOAT.
ZONEST calls EST2.

Interface

Calling Sequence

Call ZONEST

Calling sequence parameters:

None.

COMMON Block Variables Used

See Appendix A for a complete description of the COMMON block variables.

COMMON NAME	ELEMENT POSITION	VARIABLE NAME	INPUT/ OUTPUT
PARAM			
	1	NAS	I
DATA			
	1	IDSR(250)	I

Local Variables

VARIABLE NAME	DESCRIPTION
A	Area estimate.
I	Index over acreage strata.
J	Loop-index.
P	Production estimate.
IZ	Zone ID of the I-th acreage stratum.
ICURZ	Pointer to the current zone.
IMASK(250)	Vector which indicates the acreage strata in the current zone.
IOUT6	Counter used for printing sets of 6 acreage strata ID's.
ITEMP	Vector holding up to 6 acreage strata ID's in the zone.
IZONE	ID of the current zone referenced by ICURZ.
PMSPE	Production mean squared prediction error.
ARMSPE	Acreage root mean squared prediction error.
PRMSPE	Production root mean squared prediction error.
UDLINE	Data statement variable used for underlining.

Inputs

None.

Outputs

Unit	Type	Description
6	Printer	Standard output for zones.

Description

The subroutine ZONEST extracts the zone ID from the ID* of the first acreage stratum listed for a zone. Then, for each acreage stratum (from 1 to NAS) with the same zone ID, the corresponding component of the IMASK vector is set to 1. (Components of IMASK for acreage strata in different zones retain the default value of zero). The IMASK vector is supplied to the subroutine EST2 which returns acreage and production estimates and their respective mean squared prediction errors at the zone level. These estimates are printed. If there are any more zones, the process is repeated. That is, the variable ICURZ points to the next acreage stratum having a different zone ID and the IMASK vector is reset. If there are no more zones, control returns to the calling program GOAT.

In order for the subroutine ZONEST to find all the acreage strata in the same zone, it is assumed that they have been listed together. This arrangement is ensured by the ZSORT subroutine.

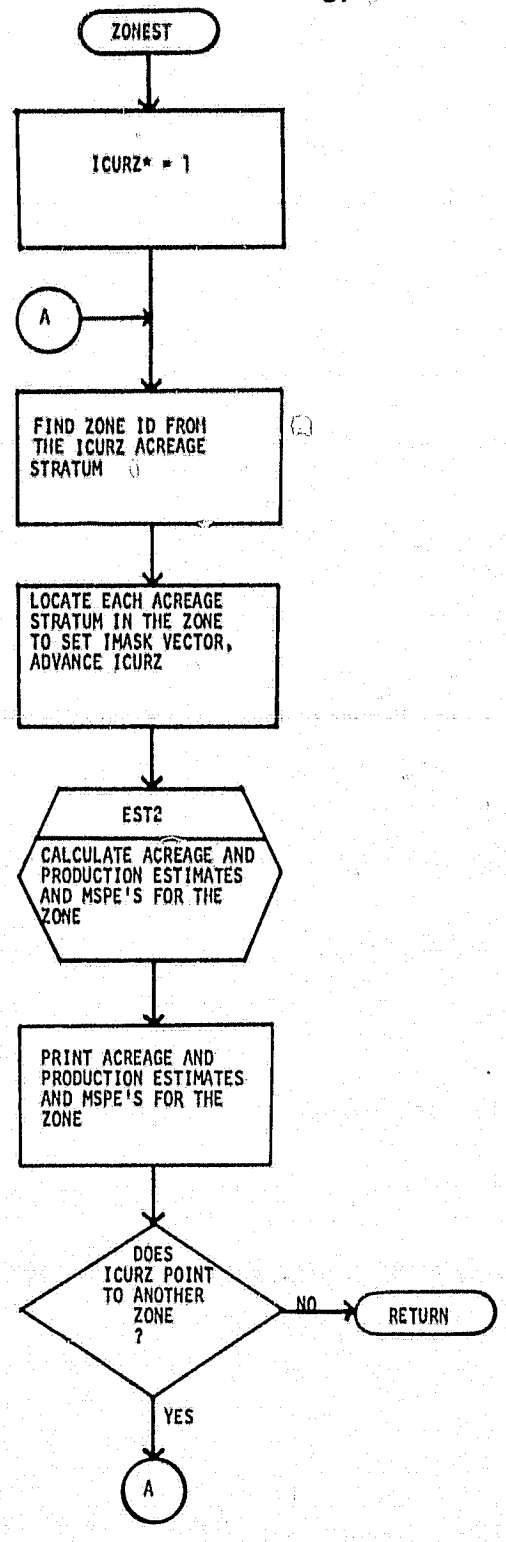
*The ID of the acreage stratum has the form xxyyy where xx is a 2 digit zone ID and yyy is a 3 digit identification for the acreage stratum in that zone. For example, 50101 indicates that stratum 101 is in zone 50.

Flowchart

See figure 3.6.14.1 for a flowchart of the subroutine ZONEST.

Listing

See Appendix B for compiled listing of ZONEST.



*ICURZ is a pointer to the first acreage stratum in the set of strata composing a zone.

Figure 3.6.14.1 Functional Flowchart of Subroutine ZONEST

3.6.15 SUBROUTINE REGION

Purpose

The purpose of subroutine REGION is to calculate and print the estimates of acreage production, and the respective mean squared prediction errors for the entire region.

Linkages

REGION is called by GOAT.
REGION calls EST2.

Interface

Calling sequence:

```
CALL REGION
```

Calling sequence parameters:

None.

COMMON Block Variables Used.

See Appendix A for a complet description of the COMMON block variables.

COMMON NAME	ELEMENT POSITION	VARIABLE USED	INPUT/ OUTPUT
PARAM			
	1	NAS	I
DATA			
	1	IDSR(250)	I

Local Variables

VARIABLE NAME	DESCRIPTION
A	Area estimate.
I	Index over acreage strata.
J	Loop-index.

VARIABLE NAME	DESCRIPTION
P	Production estimate.
IMASK(250)	Vector which indicates all the acreage strata in the region.
IOUT6	Counter used for printing sets of 6 acreage strata ID's.
ITEMP	Vector holding up to 6 acreage strat ID's of the region.
PMSPE	Production mean squared prediction error.
ARMSPE	Acreage root mean squared prediction error.
PRMSPE	Production root mean squared prediction error.
UDLINE	Data statement variable used for underlining.

Inputs

None.

Outputs

Unit	Type	Description
6	Printer	Standard output for region.

Description

The subroutine REGION sets each component of the IMASK vector that corresponds to an acreage stratum to 1. (The region is defined to be the entire set of acreage strata.) The IMASK vector is supplied to the subroutine EST2 which computes the acreage and production estimates and their respective mean squared prediction errors for the region. These estimates along with the root mean squared production estimates are printed and control returns to the calling program GOAT.

Flowchart

Not applicable.

Listing

See Appendix B for a compiled listing of REGION.

3.6.16 SUBROUTINE ARB

Purpose

The purpose of subroutine ARB is to calculate and print the estimates of acreage and production and their respective mean squared prediction errors for any arbitrary collection of acreage strata.

Linkages

ARB is called by GOAT.
ARB calls EST2.

Interface

Calling sequence:

```
CALL ARB
```

Calling sequence parameters:

None.

COMMON Block Variables Used.

See Appendix A for a complete description of the COMMON block variables.

COMMON NAME	ELEMENT POSITION	VARIABLE USED	INPUT/ OUTPUT
PARAM			
	1	NAS	I
	10	NARB	I
	11	ARBSET(20,250)	I
DATA			
	1	IDSR(250)	I

C-2

Local Variables

VARIABLE NAME	DESCRIPTION
A	Area estimate.
I	Index over acreage strata.
J	Loop-index.
P	Production estimate.
IARB	Index of arbitrary set of acreage strata.
AMSPE	Acreage mean squared prediction error.
IMASK(250)	Vector which indicates all the acreage strata in the arbitrary set.
IOUT6	Counter used for printing sets of 6 acreage strata ID's.
ITEMP	Vector holding up to 6 acreage strata ID's of the arbitrary set.
PMSPE	Production mean squared prediction error.
ARMSPE	Acreage root mean squared prediction error.
PRMSPE	Production root mean squared prediction error.
UDLINE	Data statement variable used for underlining.

Inputs

None.

Outputs

Unit	Type	Description
6	Printer	Standard output for an arbitrary region.

Description

For each acreage stratum in an arbitrary set, the subroutine ARB sets the corresponding component of the IMASK vector to 1. This information is received from the ARBSET matrix where there are NARB rows-one for each arbitrary set-and each row contains exactly the information required in the IMASK vector. For each arbitrary set of acreage strata, the IMASK vector is supplied to the subroutine EST2 which returns acreage and production estimates and their respective mean squared prediction errors for this set. These estimates are printed. When the loop over the arbitrary sets is finished, control returns to the calling program GOAT.

Flowchart

Not applicable.

Listing

See Appendix B for compiled listing of ARB.

3.6.17 SUBROUTINE EST2

Purpose

The subroutine EST2 calculates the production and acreage estimates along with their mean squared prediction error (MSPE) for any given input set of acreage strata.

Linkages

EST2 is called by the routines ZONEST, REGION and ARB.

Interface

Calling sequence:

```
CALL EST2(IMASK,AREA,AMSPE,PROC,PMSPE)
```

Calling sequence parameters:

Argument	I/O	Description
IMASK	I	A vector of 0 or 1 values indicating which of the NAS acreage strata belong to the given subset of strata.
AREA	O	Acreage estimate for the given subset of strata.
AMSPE	O	MSPE for the acreage estimate.
PROC	O	Production estimate for the given subset of strata.
PMSPE	O	MSPE for the production estimation.

COMMON Block Variables Used

See Appendix A for a description of the Common block variables

COMMON NAME	ELEMENT POSITION	VARIABLE NAME	I/O
PARAM			
	1	NAS	I
DATA			
	3	CLASS1(250)	I

COMMON NAME	ELEMENT POSITION	VARIABLE NAME	I/O
	4	DACES(250)	I
	5	VDACES(250)	I
	7	YLDEST(250)	I
	8	VARTY(250)	I
	9	VARESY(250)	I
	11	HRATYR(250)	I
EST			
	2	GROUP(250)	I
	3	HMATRX(250)	I
	4	BMATRX(250)	I
	5	GAMMA(250)	I
	6	XMATRX(250)	I
	7	XOC1(250)	I
	8	NUMYS	I
	10	IFIRST(50)	I
	11	IYD(250)	I
	12	XD(250)	I

Local Variables

VARIABLE NAME	DESCRIPTION
EX(250)	Intermediate vector for calculating production estimate. The result of multiplying the masked yield vector times the $\underline{X}$ matrix.
KG	Index for a group of acreage strata.
V1	First term of the production MSPE, equation 29, section 3.3.
V2	Second term of the production MSPE, equation 29, section 3.3.

VARIABLE NAME	DESCRIPTION
V3	Third term of the production MSPE, equation 29, section 3.3.
V4	Fourth term of the production MSPE, equation 29, section 3.3.
V5	Fifth term of the production MSPE, equation 29, section 3.3.
V6	Sixth term of the production MSPE, equation 29, section 3.3.
XO(250)	The X vector for the area estimate, equation 29, section 3.3.
SHAR(5Ø)	Intermediate vector for V2.
VA1	First term of the area MSPE, equation 35, section 3.3.
VA4	Second term of the area MSPE, equation 35, section 3.3.
VA6	Third term of the area MSPE, equation 35, section 3.3.
XBX	Intermediate value for V5.
AREA	Acreage estimate for the given set of acreage strata.
PROC	Production estimate for the given set of acreage strata.
XOC2(250)	A value for each group used in calculating the X vector, equation 34, section 3.3.
AMSPE	Estimate of the acreage MSPE.
IMASK(250)	Input vector indicating the given set of acreage strata.
INGRP	Group indicator used in building the SSTAR vector.
PMSPE	Estimate of the production MSPE.
SSTAR(250)	Indicator vector of all the acreage strata in the coverage set of strata. The union of all groups having at least one stratum in the given input set of strata (IMASK).
IYIELD	Index for the yield strata.
RMATRX(50,250)	Intermediate matrix for V5.

Inputs

None.

Outputs

None.

Description

The subroutine EST2 begins with using the input vector IMASK to set the SSTAR indicator vector which points to the acreage strata in the coverage set. Next, a constant for each group of the coverage set is found according to equation 34, section 3.3. The X vector of equation 32, section 3.3, is calculated and is then used along with the direct acreage estimates to find the acreage estimate. The MSPE for acreage is found by using the calculated X vector and two common block matrices. The production estimate is found next from the common variables and the input IMASK vector. The six components of production estimate MSPE is found according to equation 29, section 3.3, and then added together.

Flowchart

See figure 3.6.17.1 for a functional flowchart of the subroutine EST2.

Listing

See Appendix B for a compiled listing of EST2.

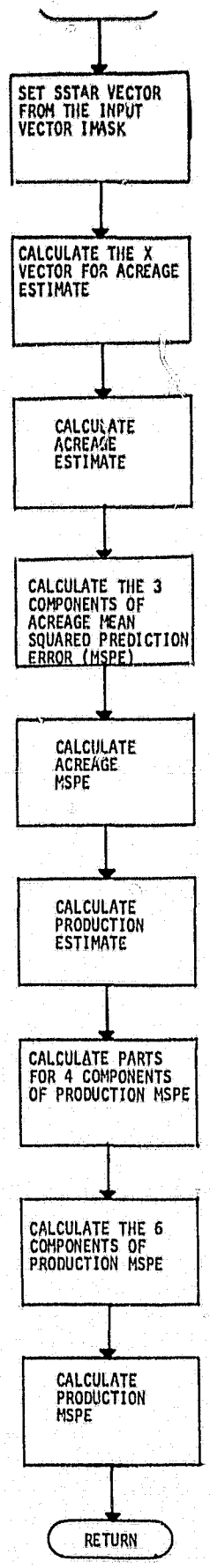


Figure 3.6.17.1 Functional Flowchart of Subroutine EST2

4. OPERATION

4.1 OPERATING REQUIREMENTS

The Grouped Optimal Aggregation Technique (GOAT) is operational on the AS-3000 computer at the Earth Observation Division, Building 17, Johnson Space Center, Houston, Texas. The program is run on the AS-3000 under the Virtual Machine 370 (VM370) Conversational Monitoring System (CMS) with the run streams (EXECS) using the control program (CP) command environment.

The user must link and access the disk where GOAT resides with the appropriate read password. For example, if the procedure is on account DS40 with read password RDS40, then the command GETDISK DS40 191 XXX B RR PASS RDS40 will link account DS40 to virtual machine address XXX (where XXX is any 3 digit number other than 191) and access it as the B disk.

A sufficient storage requirement for execution of the GOAT program is 832K bytes.

The GOAT program requires:

(1) A CONTROL CARD file as described in Section 3.4.1 and
(2) A DATA file as described in Section 3.4.2.

The program can run in either an interactive mode or a batch machine mode. If the batch mode is selected, either the module DEX370 MODULE must be on the DS40 disk to supply the userid and name to the batch machine, or if this module is absent, the EXEC will query the user for this information.

4.2 CMS EXEC

The run stream or EXEC provides the facility for providing the file-name file-type, and file-mode for the control card file and the data file. (The file mode is optional with default to the A disk). There is the facility for the batch mode or interactive mode. In the interactive mode the output can be stored on the A disk or sent to the printer. The console file is also stored and printed with the output in this mode. If the batch mode is used, the user is presented with a menu of available batch machines, their time limits, and hours of operation. See figure 4.2.1.

The listing of the GOAT EXEC is in Appendix B.

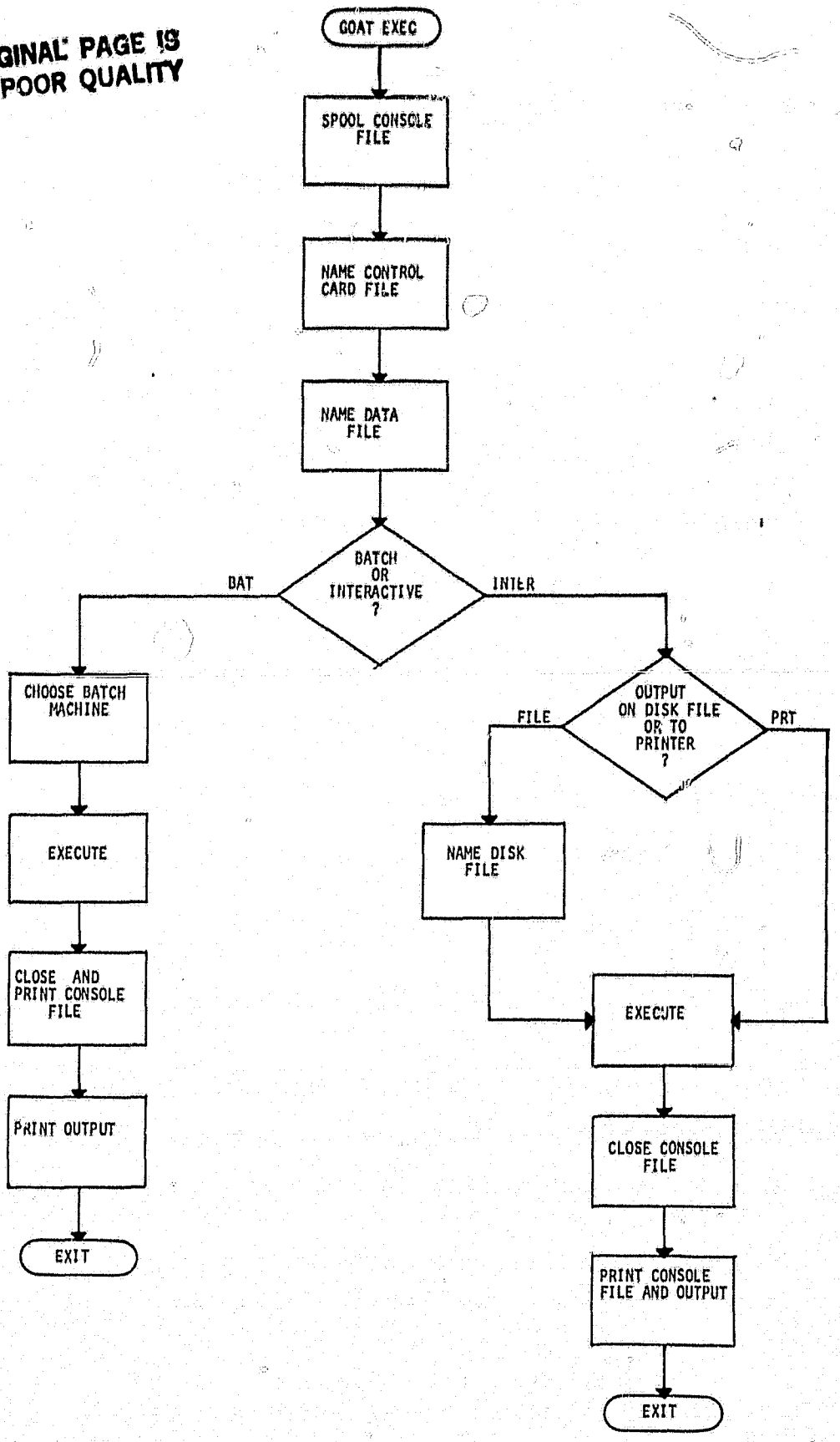


Figure 4.2.1 Functional Flowchart of GOAT EXEC.

4.3 OPERATING EXAMPLE

The command to execute the program is GOAT. After typing GOAT, the EXEC prompts the user to enter the names of the control card file and data file as follows.

```
FOR THE CONTROL CARD FILE ENTER:  FILE-NAME   FILE-TYPE   [FILE-MODE]
                                              (Default file mode is A)

FOR THE DATA FILE ENTER:  FILE-NAME   FILE-TYPE   [FILE-MODE]
```

Next, the EXEC prompts the user to choose the BATCH or INTERACTIVE mode as follows.

```
DO YOU WANT BATCH OR INTERACTIVE?  ENTER:  BAT/INTER
```

If the batch mode is chosen, the execution begins after the user's responses to the following query:

```
WHICH BATCH MACHINE DO YOU WANT?
ENTER:    FOR          TIME LIMIT (CPU MINS)    CORE    TIME UP
  1       BATQUICK              1               832K    24 HOURS
  2       BATSHORT             15               832K    24 HOURS
  3       BATMED               45               832K    24 HOURS
  4       BATEOD               60               2MEG    24 HOURS
  5       BATJSC              240               2MEG    MID-8AM
  6       BATHOUST            240               8MEG    MID-8AM
  7       BATLONG             500               2MEG    MID-8AM
```

If the interactive mode is chosen, the EXEC will continue with the following statements:

```
DO YOU WANT THE OUTPUT ON A CMS DISK FILE OR SENT TO THE PRINTER?
ENTER FILE/PRT
```

If FILE is chosen, the output from the GOAT procedure will be put on a user determined disk file which the EXEC requests:

```
FOR THE CMS DISK FILE ENTER:  FILE-NAME   FILE-TYPE   [FILE-MODE]
```

Either after this response or the PRT response above, the execution will begin in the interactive mode.

APPENDIX A
COMMON BLOCKS DESCRIPTION

COMMON NAME	ELEMENT POSITION	VARIABLE NAME	DESCRIPTION
PARAM			
	1	NAS	Total number of acreage strata.
	2	NHSYRS	Number of historical years of acreage data.
	3	NYRS1H	Number of consecutive historical years that are used to calculate the H matrix.
	4	RATOYR	The index number of the historical year used for ratioing.
	5	GAP	The number of gap years between the ratio year and the current year.
	6	ISCALE	Scaling factor for acreage.
	7	IUNITS(80)	One comment line that describes the units of acreage and production.
	8	ICROP(80)	One comment line that describes the crop type.
	9	JOIN(250,250)	A matrix denoting which acreage strata are eligible to be grouped with each stratum.
	10	NARB	Number of arbitrary subsets of acreage strata on which estimates are made.
	11	ARBSET(20,250)	A matrix in which each row denotes one of the NARB arbitrary sets of acreage strata.
	12	IOUT	A flag for optional diagnostic output.
DATA			
	1	IDSR(250)	The identifying numbers of the NAS acreage strata.

COMMON NAME	ELEMENT POSITION	VARIABLE NAME	DESCRIPTION
	2	IDYLSR(250)	The identifying numbers of the NUMYS yield strata.
	3	CLASS1(250)	Indicator vector of the Class I acreage strata.
	4	DACES(250)	Direct acreage estimates for the Class I acreage strata.
	5	VDACES(250)	Within stratum variance associated with the direct acreage estimate.
	6	TAREA(250)	A vector of the total area for each of the NAS acreage strata.
	7	YLDEST(250)	A vector of yield estimates for each acreage stratum.
	8	VARTY(250)	Estimates of the (year-to-year) variance of the true yield.
	9	VARESY(250)	Estimates of the variance of the estimated yield.
	10	HSACRE(250,10)	Historical acreages for each acreage stratum for each historical year.
	11	HRATYR(250)	Historical acreages for the ratio year.
EST			
	1	NGRPS	Number of groups of acreage strata.
	2	GROUP(250)	The group indicator for each acreage strata.
	3	HMATRX(250)	The diagonal matrix containing variances corresponding to the error term of the ratio model (equation 1, section 3.3).
	4	BMATRX(250)	The sum of the two matrices VDACES and HMATRX.

COMMON NAME	ELEMENT POSITION	VARIABLE NAME	DESCRIPTION
	5	GAMMA(250)	The estimated value of the current gamma for the group containing acreage stratum.
	6	XMATRX(250,250)	The optimal matrix for the production estimation (equation 13, section 3.3).
	7	XOC1(250)	A constant used in the $\underset{\sim}{X}$ vector of the acreage estimate. A value is given for each of the NGRPS groups.
	8	NUMYS	Total number of yield strata.
	9	IYDSEQ(50)	The unique yield strata identifiers of the vector IDYLSR.
	10	IFIRST(50)	The index number (1 up to 250) of the first acreage stratum within a yield strata.
	11	IYD(250)	Indexing of yield strata with sequential numbers (1 up to 50).
	12	XD(250)	The values resulting from the matrix $\underline{X}$ multiplied by the vector $\underset{\sim}{d}$.

APPENDIX B

COMPILED PROGRAM AND EXEC LISTINGS

```
*-------------------------------------------------------------------------*
*                                                                         *
*  R O U T I N E                                                          *
*  -------------                                                          *
*     GOAT EXEC                                                           *
*                                                                         *
*  H I S T O R Y                                                          *
*  -------------                                                          *
*     PROGRAMMER ..............PATRICK BROWN AND GARY W. SHAW            *
*                              LEMSCO    5/27/81                          *
*                                                                         *
*  P U R P O S E                                                          *
*  -------------                                                          *
*     THIS EXEC IS USED TO EXECUTE THE GROUP OPTIMAL AGGREGRATION         *
*     TECHNIQUE (GOAT) IN EITHER A BATCH OR INTERACTIVE MODE.             *
*                                                                         *
*                                                                         *
*  R E M A R K S                                                          *
*  -------------                                                          *
*     TWO FILES ARE NECESSARY TO RUN THIS PROCEDURE:  A CONTROL CARD      *
*     FILE AND A DATA FILE.                                               *
*                                                                         *
*     THERE ARE NO PARAMETERS FOR THE EXEC.                               *
*-------------------------------------------------------------------------*
   &CONTROL OFF
   CHANGE RDR ALL HOLD
   SPOOL CONSOLE START TO *
*
*     READ THE NAME OF THE CONTROL CARD FILE.
*
-CCFILE
&REGTYPE

      ( TO TERMINATE THIS SESSION, HERE OR AT ANY SUCCEEDING
        QUESTIONS, ENTER   HX    .)

      FOR THE CONTROL CARD FILE ENTER:  FILE-NAME   FILE-TYPE   (FILE-MODE)
&END
   &READ VARS  &FN4 &FT4 &FM4
*
   &IF  &FN4 EQ HX &GOTO -EXIT
   &IF .&FN4 EQ .  &GOTO -CCFILE
   &IF .&FT4 EQ .  &GOTO -CCFILE
   &IF .&FM4 EQ .  &FM4 = A
*
&TYPE CONTROL CARD FILE TO BE USED IS:  &FN4  &FT4  &FM4
*
*     READ THE NAME OF THE DATA FILE.
*
-DATAFL
&REGTYPE

      FOR THE DATA FILE ENTER:  FILE-NAME  FILE-TYPE  (FILE-MODE)
&END
   &READ VARS  &FN5 &FT5 &FM5
*
   &IF  &FN5 EQ HX &GOTO -EXIT
   &IF .&FN5 EQ .  &GOTO -DATAFL
   &IF .&FT5 EQ .  &GOTO -DATAFL
   &IF .&FM5 EQ .  &FM5 = A
*
&TYPE DATA FILE TO BE USED IS:  &FN5  &FT5  &FM5
*
*     SELECT THE BATCH OR INTERACTIVE MODE.
*
-JOB
&REGTYPE

      DO YOU WANT BATCH OR INTERACTIVE?     E N T E R : BAT/INTER
&END
-REJOB
   &READ VARS  &JOB
*
   &IF  &JOB EQ HX    &GOTO -EXIT
   &IF .&JOB EQ .     &GOTO -JOB
   &IF  &JOB EQ BAT   &GOTO -BATCH
   &IF  &JOB EQ INTER &GOTO -INTERAC
```

```
*
&BEGTYPE
        YOUR COMMAND IS NOT RECOGNIZED. TYPE  HX  IF YOU WANT
        TO TERMINATE THIS SESSION.  OTHERWISE TYPE  BAT OR INTER  .
&END
   &GOTO -REJOB
*
*     BEGINNING OF INTERACTIVE OPTION
*
-INTERAC
&BEGTYPE

      DO YOU WANT THE OUTPUT ON A CMS DISK FILE OR SENT TO THE
      PRINTER?  ENTER   FILE/PRT
&END
-REINTER
   &READ VARS &OUT6
*
   &IF  &OUT6 EQ HX   &GOTO -EXIT
   &IF .&OUT6 EQ .    &GOTO -INTERAC
   &IF  &OUT6 EQ FILE &GOTO -FILE
   &IF  &OUT6 EQ PRT  &GOTO -RUN
*
&BEGTYPE
       YOUR COMMAND IS NOT RECOGNIZED.  TYPE  HX  IF YOU WANT TO
       TERMINATE THIS SESSION.  OTHERWISE TYPE  FILE  OR  PRINT.
&END
   &GOTO -REINTER
*
*     READ THE NAME OF THE OUTPUT FILE
*
-FILE
&BEGTYPE

    FOR THE CMS DISK FILE ENTER:  FILE-NAME   FILE-TYPE   (FILE-MODE)
&END
   &READ VARS  &FN6 &FT6 &FM6
*
   &IF  &FN6 EQ HX  &GOTO -EXIT
   &IF .&FN6 EQ .   &GOTO -FILE
   &IF .&FT6 EQ .   &GOTO -FILE
   &IF .&FM6 EQ .   &FM6 = A
*
   &TYPE       OUTPUT IS ON DISK FILE:  &FN6  &FT6  &FM6
*
-RUN
*
*     FILE DEFINITION DESCRIPTION
*          UNIT    FILE DEFINITION
*          3       OUTPUT TO THE TERMINAL
*          4       INPUT FROM CONTROL CARD FILE
*          5       INPUT FROM DATA FILE
*          6       OUTPUT TO DISK OR PRINTER
*
   FI 3 TERMINAL
   FI 4 DISK &FN4 &FT4 &FM4   (LRECL 80 BLKSIZE 80 RECFM U PERM
   FI 5 DISK &FN5 &FT5 &FM5 (LRECL 160 BLKSIZE 160 RECFM U PERM
*
   &IF &OUT6 EQ PRT  FI 6 DISK $GOAT LISTING A
   &IF &OUT6 EQ PRT  &SKIP 1
   FI 6 DISK &FN6 &FT6 &FM6 (LRECL 133 BLKSIZE 133 RECFM U PERM
*
   GLOBAL  TXTLIB  CMSLIB  FORTMOD2
   TAG DEV PRINTER HOUSTON
   SPOOL PRINTER CONT NOHOLD
   LOAD GOAT (CLEAR START NOMAP
*
*   EXECUTION COMPLETE
*
   &TYPE CONSOLE FILE IS READ ONTO YOUR A DISK AS CONSOLE  FILE  A.
   SPOOL CONSOLE STOP CLOSE
   READ CONSOLE FILE
   &IF &OUT6 EQ FILE &GOTO -EXIT
   PRINT CONSOLE FILE
   PRINT $GOAT LISTING A
   &GOTO -EXIT
*
```

```
*     BEGINNING OF BATCH MACHINE OPTION.
*
-BATCH
&BEGTYPE
      WHICH BATCH MACHINE DO YOU WANT?
      ENTER:    FOR          TIME LIMIT (CPU MINS)    CORE    TIME UP
        1       BATQUICK              1               832K    24 HOURS
        2       BATSHORT             15               832K    24 HOURS
        3       BATMED               45               832K    24 HOURS
        4       BATEOD               60               2MEG    24 HOURS
        5       BATJSC              240               2MEG    MID-8AM
        6       BATHOUST            240               8MEG    MID-8AM
        7       BATLONG             500               2MEG    MID-8AM
&END
   &READ VARS &BATNO
*
   &IF   &BATNO EQ HX &GOTO -EXIT
   &IF  .&BATNO EQ .  &GOTO -BATCH
   &IF   &BATNO EQ 1  &BATMAC = BATQUICK
   &IF   &BATNO EQ 2  &BATMAC = BATSHORT
   &IF   &BATNO EQ 3  &BATMAC = BATMED
   &IF   &BATNO EQ 4  &BATMAC = BATEOD
   &IF   &BATNO EQ 5  &BATMAC = BATJSC
   &IF   &BATNO EQ 6  &BATMAC = BATHOUST
   &IF   &BATNO EQ 7  &BATMAC = BATLONG
*
*     OBTAIN THE USERID AND NAME VIA DEX370 OR DIRECTLY.
*
   DEX370
   &IF &RETCODE EQ 0 &SKIP 1
   &TYPE ENTER USERID AND NAME
   &READ ARGS
*
   CP SPOOL PUNCH NOHOLD BATCH
*
   &PUNCH BATCH MACHINE &BATMAC
   &PUNCH BATCH ID       &1   &2
   &PUNCH BATCH OUTPUT   HOUSTON HOUSTON
   &PUNCH EXEC$$
   &PUNCH GETDISK DS40 191 195 B/A RR PASS RDS40
   &PUNCH TAG DEV CONSOLE HOUSTON
   &PUNCH SPOOL CONSOLE START NOHOLD TO RSCS
*
* GOAT EXEC
*
   &PUNCH FI 3 TERMINAL
   &PUNCH FI 4 DISK &FN4 &FT4 &FM4  (LRECL 80 BLKSIZE 80 RECFM U PERM
   &PUNCH FI 5 DISK &FN5 &FT5 &FM5  (LRECL 160 BLKSIZE 160 RECFM U PERM
   &PUNCH FI 6 DISK $GOAT LISTING A
*
   &PUNCH GLOBAL  TXTLIB    CMSLIB FORTMOD2
   &PUNCH TAG DEV PRINTER HOUSTON
   &PUNCH SPOOL PRINTER CONT NOHOLD
   &PUNCH LOAD GOAT (CLEAR START NOMAP
*
*    EXECUTION COMPLETE
*
   &PUNCH SPOOL CONSOLE STOP CLOSE
   &PUNCH PRINT $GOAT LISTING A
*
   &PUNCH $$
*
   CP SPOOL PUNCH CLOSE
   CP SPOOL PUNCH HOLD RSCS
-EXIT
   SPOOL PRINTER NOCONT CLOSE
   &EXIT
```

REQUESTED OPTIONS:

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

```
                C------------------------------------------------------------------- CGOA00010
                C                                                                    CGOA00020
                C     M A I N                                                        CGOA00030
                C ------------------                                                 CGOA00040
                C     GOAT                                                           CGOA00050
                C                                                                    CGOA00060
                C H I S T O R Y                                                      CGOA00070
                C -------------                                                      CGOA00080
                C     PROGRAMMER ..... GARY W. SHAW .LEMSCO .5/15/81                 CGOA00090
                C                                                                    CGOA00100
                C P U R P O S E                                                      CGOA00110
                C -------------                                                      CGOA00120
                C        TO AGGREGATE THE ACERAGE STRATA PROPORTION CROP ESTIMATES    CGOA00130
                C     TO ZONE AND REGIONAL CROP AREA AND PRODUCTION ESTIMATES.        CGOA00140
                C                                                                    CGOA00150
                C SUBROUTINES REQUIRED                                               CGOA00160
                C ---------------------                                              CGOA00170
                C     READFL     READ INPUT DATA AND CONTROL FILES.                  CGOA00180
                C     GRPING     FINDS THE OPTIMAL GROUPING OF THE ACREAGE STRATA.   CGOA00190
                C     PREST      CALCULATIONS FOR ESTIMATION.                        CGOA00200
                C     STATS      SUMMARY OUTPUT OF INPUTTED DATA.                    CGOA00210
                C     ZONEST     ZONE ESTIMATES AND OUTPUTS.                         CGOA00220
                C     REGION     REGIONAL ESTIMATES AND OUTPUTS.                     CGOA00230
                C     ARB        ARBRITARY SET OF ACREAGE STRATA ESTIMATES AND OUTPUT.CGOA00240
                C                                                                    CGOA00250
                C R E M A R K S                                                      CGOA00260
                C -------------                                                      CGOA00270
                C     NONE                                                           CGOA00280
                C------------------------------------------------------------------- CGOA00290
ISN 0002              INTEGER  RATOYR ,GAP                                           GOA00300
ISN 0003              INTEGER*2  JOIN,  ARBSET                                       GOA00310
ISN 0004              COMMON /PARAM/NAS          ,NHSYRS       ,NYRSIH       ,      GOA00320
                     #               RATOYR      ,GAP                        ,      GOA00330
                     #               ISCALE      ,IUNITS(80)   ,ICROP(80)    ,      GOA00340
                     #               JOIN(250,250),NARB        ,ARBSET(20,250),     GOA00350
                     #               IOUT                                           GOA00360
                C                                                                    GOA00370
ISN 0005              INTEGER  CLASS1                                                GOA00380
ISN 0006              COMMON /DATA/ IDSR(250)    ,IDYLSR(250)                  ,     GOA00390
                     #               CLASS1(250) ,                             ,     GOA00400
                     #               DACES(250)  ,VDACES(250) ,TAREA(250)      ,     GOA00410
                     #               YLDEST(250) ,VARTY(250)  ,VARESY(250)     ,     GOA00420
                     #               HSACRE(250,10),HRATYR(250)                     GOA00430
                C                                                                    GOA00440
ISN 0007              INTEGER GROUP                                                  GOA00450
ISN 0008              COMMON /EST/ NGRPS         ,GROUP(250)    ,HMATRX(250)  ,     GOA00460
                     #               BMATRX(250)                               ,     GOA00470
                     #               GAMMA(250)  ,XMATRX(250,250),XOC1(250)    ,     GOA00480
                     #               NUMYS       ,IYDSEQ(50)    ,IFIRST(50)    ,     GOA00490
                     #               IYD(250)    ,XD(250)                             GOA00500
                C                                                                    GOA00510
                C READ THE CONTROL CARD FILE AND DATA FILE.                          GOA00520
                C                                                                    GOA00530
ISN 0009              CALL READFL(IERROR)                                            GOA00540
ISN 0010              IF(IERROR .NE. 0) STOP 10001                                   GOA00550
                C                                                                    GOA00560
                C FIND GROUPING OF THE ACREAGE STRATA.                               GOA00570
                C                                                                    GOA00580
ISN 0012              CALL GRPING(NGRPS,GROUP,HMATRX)                                GOA00590
                C                                                                    GOA00600
                C PRECALCULATION BEFORE ESTIMATION.                                  GOA00610
                C                                                                    GOA00620
ISN 0013              CALL PREST                                                     GOA00630
                C                                                                    GOA00640
                C OUTPUT OF DATA SUMMARY.                                            GOA00650
                C                                                                    GOA00660
ISN 0014              CALL STATS                                                     GOA00670
                C                                                                    GOA00680
                C ESTIMATIONS FOR THE ZONES AND OUTPUTS.                             GOA00690
                C                                                                    GOA00700
ISN 0015              CALL ZONEST                                                    GOA00710
                C                                                                    GOA00720
                C ESTIMATIONS FOR THE REGION AND OUTPUTS.                            GOA00730
```

```
                C
   ISN 0016           CALL REGION                                              GOA00740
                C                                                              GOA00750
                C                                                              GOA00760
                C  ESTIMATIONS FOR GIVEN ARBRITRARY COLLECTION OF ACREAGE STRATA GOA00770
                C      AND OUTPUTS.                                            GOA00780
                C                                                              GOA00790
   ISN 0017           CALL ARB(NARB,ARBSET)                                    GOA00800
                C                                                              GOA00810
   ISN 0018           STOP                                                     GOA00820
   ISN 0019           END                                                      GOA00830
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS		
XD	0008		
ARB	0017		
GAP	0002	0004	
IYD	0008		
NAS	0004		
IDSR	0006		
IOUT	0004		
JOIN	0003	0004	
NARB	0004	0017	
XOCI	0008		
DACES	0006		
GAMMA	0008		
GROUP	0007	0008	0012
ICROP	0004		
NGRPS	0008	0012	
NUMYS	0008		
PREST	0013		
STATS	0014		
TAREA	0006		
VARTY	0006		
ARBSET	0003	0004	0017
BMATRX	0008		
CLASSI	0005	0006	
GRPING	0012		
HMATRX	0008	0012	
HRATYR	0006		
HSACRE	0006		
IDYLSR	0006		
IERROR	0009	0010	
IFIRST	0008		
ISCALE	0004		
IUNITS	0004		
IYDSEQ	0008		
NHSYRS	0004		
NYRSIH	0004		
RATOYR	0002	0004	
READFL	0009		
REGION	0016		
VARESY	0006		
VDACES	0006		
XMATRX	0008		
YLDEST	0006		
ZONEST	0015		

/ MAIN / SIZE OF PROGRAM 00017A HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
XD	C	R*4	NR	ARB	SF XF		000000	GAP	C	I*4	NR	IYD	C	I*4	NR
NAS	C	I*4	NR	IDSR	C	I*4	NR	IOUT	C	I*4	NR	JOIN	C	I*2	NR
NARB	SFA C	I*4	01EAE0	XOCI	C	R*4	NR	DACES	C	R*4	NR	GAMMA	C	R*4	NR
GROUP	SFA C	I*4	000004	ICROP	C	I*4	NR	NGRPS	SFA C	I*4	000000	NUMYS	C	I*4	NR
PREST	SF XF		000000	STATS	SF XF		000000	TAREA	C	R*4	NR	VARTY	C	R*4	NR
ARBSET	SFA C	I*2	01EAE4	BMATRX	C	R*4	NR	CLASSI	C	I*4	NR	GRPING	SF XF		000000
HMATRX	SFA C	R*4	0003EC	HRATYR	C	R*4	NR	HSACRE	C	R*4	NR	IBCOM#	XF	I*4	000000
IDYLSR	C	I*4	NR	IERROR	SFA	I*4	0000A8	IFIRST	C	I*4	NR	ISCALE	C	I*4	NR
IUNITS	C	I*4	NR	IYDSEQ	C	I*4	NR	NHSYRS	C	I*4	NR	NYRSIH	C	I*4	NR
RATOYR	C	I*4	NR	READFL	SF XF		000000	REGION	SF XF		000000	VARESY	C	R*4	NR
VDACES	C	R*4	NR	XMATRX	C	R*4	NR	YLDEST	C	R*4	NR	ZONEST	SF XF		(000000

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * PARAM* SIZE OF BLOCK 0211F8 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NAS	I*4	000000 NR	NHSYRS	I*4	000004 NR	NYRSIM	I*4	000008 NR	RATOYR	I*4	00000C NR
GAP	I*4	000010 NR	ISCALE	I*4	000014 NR	IUNITS	I*4	000018 NR	ICROP	I*4	00015B NR
JOIN	I*2	000298 NR	NARB	I*4	01EAE0	ARBSET	I*2	01EAE4	IOUT	I*4	0211F4 NR

NAME OF COMMON BLOCK * DATA* SIZE OF BLOCK 004E20 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
IDSR	I*4	000000 NR	IDYLSR	I*4	0003E8 NR	CLASSI	I*4	0007D0 NR	DACES	R*4	000BB8 NR
VDACES	R*4	000FA0 NR	TAREA	R*4	001388 NR	YLOEST	R*4	001770 NR	VARTY	R*4	001B58 NR
VARESY	R*4	001F40 NR	HSACRE	R*4	002328 NR	HRATYR	R*4	004A38 NR			

NAME OF COMMON BLOCK * EST* SIZE OF BLOCK 03ED80 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NGRPS	I*4	000000	GROUP	I*4	000004	HMATRX	R*4	0003EC	BMATRX	R*4	000704 NR
GAMMA	R*4	000BBC NR	XMATRX	R*4	000FA4 NR	KOCI	R*4	03E034 NR	NUMYS	I*4	03E41C NR
IYDSEQ	I*4	03E420 NR	IFIRST	I*4	03E4E8 NR	IYD	I*4	03E586 NR	XD	R*4	03E998 NR

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100000	1	0000F0	100001	11	00010C	100002	12	00011A			

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOAMSF TERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 18, PROGRAM SIZE = 378, SUBPROGRAM NAME = MAIN

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 225K BYTES OF CORE NOT USED

REQUESTED OPTIONS:

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

```
ISN 0002            SUBROUTINE ARB                                                  ARB00010
                    C-------------------------------------------------------------CARB00020
                    C                                                               CARB00030
                    C  S U B R O U T I N E                                          CARB00040
                    C  -------------------                                          CARB00050
                    C      ARB                                                      CARB00060
                    C                                                               CARB00070
                    C  H I S T O R Y                                                CARB00080
                    C  -------------                                                CARB00090
                    C      PROGRAMMER ..... GARY W. SHAW .LEMSCO .5/15/81           CARB00100
                    C                                                               CARB00110
                    C  P U R P O S E                                                CARB00120
                    C  -------------                                                CARB00130
                    C      TO CALCULATE ESTIMATES FOR ANY ARBRITARY COLLECTION OF   CARB00140
                    C     ACREAGE STRATA AS DEFINED IN THE CC INPUT FILE.           CARB00150
                    C                                                               CARB00160
                    C  SUBROUTINES REQUIRED                                         CARB00170
                    C  --------------------                                         CARB00180
                    C      EST2                                                     CARB00190
                    C                                                               CARB00200
                    C  R E M A R K S                                                CARB00210
                    C  -------------                                                CARB00220
                    C                                                               CARB00230
                    C-------------------------------------------------------------CARB00240
ISN 0003            INTEGER  CLASS1                                                 ARB00250
ISN 0004            COMMON /DATA/ IDSR(250)      ,IDYLSR(250)                   ,    ARB00260
                   #              CLASS1(250)    ,                                   ARB00270
                   #              ACES(250)      ,VDACES(250)  ,TAREA(250)      ,    ARB00280
                   #              LDEST(250)     ,VARTY(250)   ,VARESY(250)     ,    ARB00290
                   #              HSACRE(250,10) ,HRATYR(250)                        ARB00300
ISN 0005            INTEGER  RATOYR ,GAP                                            ARB00310
ISN 0006            INTEGER*2  JOIN, ARBSET                                         ARB00320
ISN 0007            COMMON /PARAM/NAS            ,NHSYRS       ,NYRS1H        ,    ARB00330
                   #              RATOYR         ,GAP          ,              ,    ARB00340
                   #              ISCALE         ,IUNITS(80)   ,ICROP(80)     ,    ARB00350
                   #              JOIN(250,250)  ,NARB         ,ARBSET(20,250),    ARB00360
                   #              IOUT                                               ARB00370
                    C-------------------------------------------------------------CARB00380
                    C        DIMENSIONS FOR LOCAL VARIABLES.                        CARB00390
                    C-------------------------------------------------------------CARB00400
ISN 0008            DIMENSION IMASK(250), ITEMP(6)                                  ARB00410
ISN 0009            DATA     UDLINE /'    '/                                        ARB00420
                    C**************** S U B R O U T I N E   STARTS ****************CARB00430
                    C        CHECK TO SEE IF WE IN FACT HAVE ANY ARBRITARY SET.     CARB00440
                    C-------------------------------------------------------------CARB00450
ISN 0010            IF (NARB.LE.0) RETURN                                           ARB00460
                    C-------------------------------------------------------------CARB00470
                    C        THE FOLLOWING LOOP IS FOR THE NARB NUMBER OF ARBRITARY SETS.  CARB00480
                    C-------------------------------------------------------------CARB00490
ISN 0012            DO 40 IARB = 1,NARB                                             ARB00500
ISN 0013              DO 10 I = 1,NAS                                               ARB00510
ISN 0014              IMASK(I) = ARBSET(IARB,I)                                     ARB00520
ISN 0015      10    CONTINUE                                                        ARB00530
                    C                                                               ARB00540
ISN 0016             CALL EST2(IMASK, A,AMSPE, P,PMSPE)                             ARB00550
                    C                                                               ARB00560
                    C        -------------------------------------------------------CARB00570
                    C        -           O U T P U T S                             CARB00580
                    C        -------------------------------------------------------CARB00590
ISN 0017             WRITE(6,900) IARB                                              ARB00600
ISN 0018             WRITE(6,910)                                                   ARB00610
ISN 0019             IOUT6 = 0                                                      ARB00620
ISN 0020             DO 20 I = 1,NAS                                                ARB00630
ISN 0021               IF (IOUT6.EQ.6) WRITE(6,920) (ITEMP(J), J =1,6)              ARB00640
ISN 0023               IF (IOUT6.EQ.6) IOUT6 = 0                                    ARB00650
ISN 0025               IF (IMASK(I).EQ.1) IOUT6 = IOUT6 + 1                         ARB00660
ISN 0027               IF (IMASK(I).EQ.1) ITEMP(IOUT6) = IDSR(I)                    ARB00670
ISN 0029      20     CONTINUE                                                       ARB00680
ISN 0030             IF (IOUT6.GT.0) WRITE(6,920) (ITEMP(J), J = 1,IOUT6)           ARB00690
ISN 0032             WRITE(6,930) (UDLINE,I = 1,12)                                 ARB00700
ISN 0033             ARMSPE = SQRT(AMSPE)                                           ARB00710
ISN 0034             PRMSPE = SQRT(PMSPE)                                           ARB00720
ISN 0035             WRITE(6,940)  A,AMSPE,ARMSPE,P,PMSPE,PRMSPE                    ARB00730
```

```
   ISN 0036        40 CONTINUE                                                    ARB00740
                C-----------------------------------------------------------------CARB00750
   ISN 0037           RETURN                                                      ARB00760
   ISN 0038         900 FORMAT('1',20X,'ESTIMATES FOR ARBRITARY SET ',I3,'.')     ARB00770
   ISN 0039         910 FORMAT(///,10X,                                           ARB00780
                    #     'THIS SET INCLUDES THE FOLLOWING ACREAGE STRATA :.'///) ARB00790
   ISN 0040         920 FORMAT(10X,6(I5,3X))                                      ARB00800
   ISN 0041         930 FORMAT(/,'*',7X,12A4)                                     ARB00810
   ISN 0042         940 FORMAT(//,38X,'AREA ESTIMATE =',F18.4,                    ARB00820
                    #       //,10X,'ESTIMATE OF MEAN SQUARED PREDICTION ERROR =',F18.4,ARB00830
                    #       //,17X,'ROOT MEAN SQUARED PREDICTION ERROR =',F18.4,  ARB00840
                    #      ////,32X,'PRODUCTION ESTIMATE =',F18.4,                 ARB00850
                    #       //,10X,'ESTIMATE OF MEAN SQUARED PREDICTION ERROR =',F18.4,ARB00860
                    #       //,17X,'ROOT MEAN SQUARED PREDICTION ERROR =',F18.4  ) ARB00870
   ISN 0043           END                                                         ARB00880
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS
A	0016 0035
I	0013 0014 0014 0020 0025 0027 0027 0032 0032
J	0021 0021 0021 0030 0030 0030
P	0016 0035
ARB	0002
GAP	0005 0007
NAS	0007 0013 0020
EST2	0016
IARB	0012 0014 0017
IDSR	0004 0027
IOUT	0007
JOIN	0006 0007
NARB	0007 0010 0012
SQRT	0033 0034
AMSPE	0016 0033 0035
DACES	0004
ICROP	0007
IMASK	0008 0014 0016 0025 0027
IOUT6	0019 0021 0023 0023 0025 0025 0027 0030 0030
ITEMP	0008 0021 0027 0030
PMSPE	0016 0034 0035
TAREA	0004
VARTY	0004
ARBSET	0006 0007 0014
ARMSPE	0033 0035
CLASSI	0003 0004
HRATYR	0004
HSACRE	0004
IDYLSR	0004
ISCALE	0007
IUNITS	0007
NHSYRS	0007
NYRSIH	0007
PRMSPE	0034 0035
RATOYR	0005 0007
UDLINE	0009 0032
VARESY	0004
VDACES	0004
YLDEST	0004

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES
10	0015	0013
20	0029	0020
40	0036	0013
900	0038	0017
910	0039	0018
920	0040	0021 0030
930	0041	0032
940	0042	0035

/ ARB / SIZE OF PROGRAM 000888 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
A	SFA	R*4	000234	I	SF C	I*4	000238	J	F C	I*4	00023C	P	SFA	R*4	000240
ARB		R*4	000244	GAP	C	I*4	NR	NAS	F C	I*4	000000	EST2	SF XF		000008
IARB	SF	I*4	000248	IDSR	F C	I*4	000000	IOUT	C	I*4	NR	JOIN	C	I*2	NR

NARB	F	C	I*4	01EAE0	SQRT	F	XF	R*4	000000	AMSPE	SFA		R*4	00024C	DACES		C	R*4	NR
ICROP		C	I*4	NR	IMASK	SFA		I*4	000264	IOUT6	SF		I*4	000250	ITEMP	SF		I*4	00064C
PMSPE	SFA		R*4	000254	IAREA		C	R*4	NR	VARTY		C	R*4	NR	ARBSET	F	C	I*2	01EAE4
ARMSPE	SF		R*4	000258	CLASS1		C	I*4	NR	HRATYR		C	R*4	NR	HSACRE		C	R*4	NR
IBCOM#	F	XF	R*4	000000	IDYLSR		C	I*4	NR	ISCALE		C	I*4	NR	IUNITS		C	I*4	NR
NHSYRS		C	I*4	NR	NYRS1H		C	I*4	NR	PRMSPE	SF		R*4	00025C	RATOYR		C	I*4	NR
UDLINE	F		R*4	000260	VARESY		C	R*4	NR	VDACES		C	R*4	NR	YLDEST		C	R*4	NR

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * DATA* SIZE OF BLOCK 004E20 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
IDSR	I*4	000000	IDYLSR	I*4	0003E8 NR	CLASS1	I*4	0007D0 NR	DACES	R*4	000BB8 NR
VDACES	R*4	000FA0 NR	IAREA	R*4	001388 NR	YLDEST	R*4	001770 NR	VARTY	R*4	001B58 NR
VARESY	R*4	001F40 NR	HSACRE	R*4	002328 NR	HRATYR	R*4	004A38 NR			

NAME OF COMMON BLOCK * PARAM* SIZE OF BLOCK 0211F8 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NAS	I*4	000000	NHSYRS	I*4	000004 NR	NYRS1H	I*4	000008 NR	RATOYR	I*4	00000C NR
GAP	I*4	000010 NR	ISCALE	I*4	000014 NR	IUNITS	I*4	000018 NR	ICROP	I*4	000158 NR
JOIN	I*2	000298 NR	NARB	I*4	01EAE0	ARBSET	I*2	01EAE4	IOUT	I*4	0211F4 NR

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
10	15	0006DE	20	29	000788	40	36	000884			

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	000694	100002	11	0006AE	100003	12	0006BA	100004	13	0006BE
100005	14	0006C0	100006	16	0006E8	100007	21	000720	100008	22	00073A
100011	23	000764	100012	24	000770	100013	25	000778	100014	26	000786
100015	27	000790	100016	28	00079E	100017	30	0007C2	100018	31	0007CC
100021	32	0007FC	100024	37	000896						

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
900	38	000028	910	39	000052	920	40	000080	930	41	000099
940	42	0000A5									

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 42, PROGRAM SIZE = 2232, SUBPROGRAM NAME = ARB

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 217K BYTES OF CORE NOT USED

REQUESTED OPTIONS:

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSI [illegible] IBM FLAG(I)

```
ISN 0002          SUBROUTINE AVOPT                                                    AVO00010
                  I( NSET  ,ISET  ,                                                   AVO00020
                  O                VOPT  ,HMAT )                                      AVO00030
                C-----------------------------------------------------------------CAVO00040
                C                                                                   CAVO00050
                C  S U B R O U T I N E                                              CAVO00060
                C  -------------------                                              CAVO00070
                C      AVOPT                                                        CAVO00080
                C                                                                   CAVO00090
                C  H I S T O R Y                                                    CAVO00100
                C  -------------                                                    CAVO00110
                C      PROGRAMMER ............... GARY W. SHAW .LEMSCO .5/15/81   CAVO00120
                C                                                                   CAVO00130
                C  P U R P O S E                                                    CAVO00140
                C  -------------                                                    CAVO00150
                C      TO CALCULATE THE NEW MEAN SQUARE PREDICTION ERROR            CAVO00160
                C  ASSOCIATED WITH A GIVEN SET OF ACREAGE STRATA.                   CAVO00170
                C                                                                   CAVO00180
                C  SUBROUTINES REQUIRED                                             CAVO00190
                C  ---------------------                                            CAVO00200
                C     HGAMMA    FINDS THE HISTORICAL GAMMA VALUES.                  CAVO00210
                C                                                                   CAVO00220
                C  R E M A R K S                                                    CAVO00230
                C  -------------                                                    CAVO00240
                C                                                                   CAVO00250
                C     NSET    = TOTAL NUMBER IN THE SET OF ACREAGE STRATA.          CAVO00260
                C     ISET(I) = ARRAY OF THE ACREAGE STRATA INDEXES ASSIGNED IN THE CAVO00270
                C               MAIN SECTION ON INPUT.                              CAVO00280
                C     VOPT    = THE MSPE FOR THIS SET OF ACREAGE STRATA.            CAVO00290
                C     HMAT(I) = THE H MATRIX ELEMENTS FOR THIS SET OF ACREAGE STRARA. CAVO00300
                C-----------------------------------------------------------------CAVO00310
ISN 0003          INTEGER    RATOYR  ,GAP                                           AVO00320
ISN 0004          INTEGER*2  JOIN, ARBSET                                           AVO00330
ISN 0005          COMMON /PARAM/NAS          ,NSYRS      ,NYRS1H      ,            AVO00340
                  #              RATOYR      ,GAP                     ,            AVO00350
                  #              ISCALE      ,IUNITS(80)  ,ICROP(80)   ,            AVO00360
                  #              JOIN(250,250)  ,NARB     ,ARBSET(20,250),          AVO00370
                  #              IOUT                                              AVO00380
ISN 0006          INTEGER    CLASS1                                                 AVO00390
ISN 0007          COMMON /DATA/ IDSR(250)       ,IDYLSR(250)             ,        AVO00400
                  #              CLASS1(250)    ,                                  AVO00410
                  #              DACES(250)     ,VDACES(250)  ,TAREA(250)  ,        AVO00420
                  #              YLDEST(250)    ,VARTY(250)   ,VARESY(250) ,        AVO00430
                  #              HSACRE(250,10) ,HRATYR(250)                       AVO00440
                C-----------------------------------------------------------------CAVO00450
                C  DIMENSIONS FOR LOCAL VARIABLES.                                  CAVO00460
                C-----------------------------------------------------------------CAVO00470
ISN 0008          DIMENSION      ISET(NSET)    ,HMAT(NSET)   ,HISGAM(10)          AVO00480
                C-----------------------------------------------------------------CAVO00490
ISN 0009          IF (NSET.LE.0) STOP 30001                                         AVO00500
                C-----------------------------------------------------------------CAVO00510
                C     CHECK FIRST IF THERE IS ONLY ONE ACREAGE STRATUM IN THIS SET.  CAVO00520
                C     IF THIS IS THE CASE,THEN AVOPT IS THE VALUE OF VARIANCE OF    CAVO00530
                C     THE DIRECT ESTIMATE. ALSO THE H MATRIX (ONE ELEMENT) IS SET TO CAVO00540
                C     A VALUE OF ZERO.  THE SUBROUTINE IS THEN FINISHED.            CAVO00550
                C-----------------------------------------------------------------CAVO00560
ISN 0011          IF (NSET.GT.1) GO TO 1                                            AVO00570
ISN 0013          IAS     = ISET(1)                                                 AVO00580
ISN 0014          VOPT    = VDACES(IAS)                                             AVO00590
ISN 0015          HMAT(1) = 0.0                                                     AVO00600
ISN 0016          RETURN                                                            AVO00610
                C                                                                   AVO00620
ISN 0017        1 CONTINUE                                                          AVO00630
                C-----------------------------------------------------------------CAVO00640
                C   ESTIMATE THE HISTORICAL ACREAGE RATIOS (GAMMAS).                CAVO00650
                C-----------------------------------------------------------------CAVO00660
ISN 0018          CALL HGAMMA(NSET,ISET,HISGAM)                                     AVO00670
                C-----------------------------------------------------------------CAVO00680
                C   CALCULATION OF THE H MATRIX FOR THIS SET OF ACREAGE SRATRA.     CAVO00690
                C                                                                   CAVO00700
                C          NOTE :  THIS H MATRIX WILL ONLY HAVE NSET TOTAL ELEMENTS CAVO00710
                C                  WHICH ARE STORED IN THE FIRST NSET ELEMENTS OF   CAVO00720
                C                  HMAT . WE MAY HAVE A MAXIMUM OF NAS ELEMENTS.    CAVO00730
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                C-------------------------------------------------------------------CAV000740
ISN 0019              IF (NSET.LE.0) STOP 30010                                     AV000750
ISN 0021              DO 10 I =1.NSET                                               AV000760
ISN 0022                HMAT(I) = 0.0                                               AV000770
ISN 0023           10 CONTINUE                                                      AV000780
ISN 0024              CGAM   = 0.0                                                  AV000790
ISN 0025              CGAMK  = 0.0                                                  AV000800
ISN 0026              TOP    = 0.0                                                  AV000810
ISN 0027              BOT    = 0.0                                                  AV000820
ISN 0028              DO 20 I =1.NSET                                               AV000830
ISN 0029                IAS  = ISET(I)                                              AV000840
ISN 0030                TOP  = TOP     + DACES(IAS)                                 AV000850
ISN 0031                BOT  = BOT     + HRATYR(IAS)                                AV000860
ISN 0032           20 CONTINUE                                                      AV000870
ISN 0033              IF (BOT.EQ.0) STOP 30020                                      AV000880
ISN 0035              IF (GAP.EQ.0) STOP 30021                                      AV000890
ISN 0037              CGAM  = (TOP/BOT) ** (1.0/GAP)                                AV000900
ISN 0038              CGAMK = (TOP/BOT)                                             AV000910
                C                                                                   AV000920
ISN 0039              IF (NYRS1H.LE.1) STOP 30022                                   AV000930
ISN 0041              THETA = 0.0                                                   AV000940
ISN 0042              DO 30 KYEAR = 2.NYRS1H                                        AV000950
ISN 0043                DO 30 I = 1.NSET                                            AV000960
ISN 0044                  IAS  = ISET(I)                                            AV000970
ISN 0045                  KYRM1 = KYEAR - 1                                         AV000980
ISN 0046                  EP   = HISGAM(KYEAR) * HSACRE(IAS,KYRM1)  / TAREA(IAS)    AV000990
ISN 0047                  D2   = HSACRE(IAS,KYEAR) / TAREA(IAS)  -  EP              AV001000
ISN 0048                  BVAR = EP * (1.0-EP)                                      AV001010
ISN 0049                  IF (BVAR.EQ.0) STOP 30030                                 AV001020
ISN 0051                  THETA= THETA + TAREA(IAS) * (D2**2) / BVAR                AV001030
ISN 0052           30   CONTINUE                                                    AV001040
ISN 0053              IF (NSET.EQ.1) THETA = 0.0                                    AV001050
ISN 0055              IF (NSET.GT.1) THETA = THETA / (NSET) / (NYRS1H-1)             AV001060
ISN 0057              DO 40 I = 1.NSET                                              AV001070
ISN 0058                IAS = ISET(I)                                               AV001080
ISN 0059                T2  = THETA / TAREA(IAS)                                    AV001090
ISN 0060                X1  = 1.0 - T2                                              AV001100
ISN 0061                IF (X1.EQ.1.0) B2 = GAP                                     AV001110
ISN 0063                IF (X1.NE.1.0) B2 = (X1**GAP - 1.0) / (X1 - 1.0)            AV001120
ISN 0065                GX1 = CGAM * X1                                             AV001130
ISN 0066                IF (GX1.EQ.1.0) B1 = GAP                                    AV001140
ISN 0068                IF (GX1.NE.1.0) B1 = (GX1**GAP - 1.0) / (GX1 - 1.0)         AV001150
ISN 0070                HMAT(I) = T2 * HRATYR(IAS)                                  AV001160
                #                    * CGAMK                                        AV001170
                #                    * (TAREA(IAS) * B1  -  CGAMK * HRATYR(IAS) * B2)  AV001180
ISN 0071           40 CONTINUE                                                      AV001190
                C-------------------------------------------------------------------CAV001200
                C                                                                   CAV001210
                C     CALCULATION OF THE THREE COMPONENTS FOR THE MSPE OF THE ACREAGECAV001220
                C  ESTIMATE.                                                        CAV001230
                C                                                                   CAV001240
                C     NOTE THAT THE ACTUAL ACREAGE ESTIMATE NEED NOT BE CALCULATED AT CAV001250
                C          THIS POINT, SINCE WE ARE DETERMINING THE GROUPING ONLY BY CAV001260
                C          TESTING ON THE MSPE OF THE ACREAGE ESTIMATE.             CAV001270
                C                                                                   CAV001280
                C     AVOPT = (EHIS-BD1)**2 / BD3  - BD2 + EHE                      CAV001290
                C     WHERE :                                                       CAV001300
                C           EHIS  = SUMMATION OF ALL THE HISTORICAL CROP ACREAGE FOR CAV001310
                C                   THIS GROUP.                                     CAV001320
                C           EHE   = SUMMATION OF ALL THE H MATRIX VALUES FOR THIS SET. CAV001330
                C           BD1   = (H1E1 + H3E2) * INV(S+H1) *       HIS1          CAV001340
                C           BD2   = (H1E1 + H3E2) * INV(S+H1) * (H1E1 + H3E2)       CAV001350
                C           BD3   =       HIS1    * INV(S+H1) *       HIS1          CAV001360
                C           WHERE :                                                 CAV001370
                C                 H1    = H MATRIX FOR THE CLASS 1                  CAV001380
                C                 E1    = A M BY 1 ONES VECTOR                      CAV001390
                C                 H3    = H MATRIX FOR THE CLASS 2                  CAV001400
                C                 E2    = A N-M BY 1 ONES VECTOR                    CAV001410
                C                 S     = SIGMA MATRIX (=VDACES(*))                 CAV001420
                C                 HIS1  =HISTORICAL ACREAGE DATA FOR CLASS 1 ONLY   CAV001430
                C           NOTE:                                                   CAV001440
                C             1.(S+H1) IS DIAGONAL SINCE H1 IS ASSUMED TO BE DIAGIONAL. CAV001450
                C                 THUS INV(S+H1) IS THE ELEMENTWISE RECIPROCAL OF THE CAV001460
                C                 DIAGONAL ELEMENTS OF (S+H1).                      CAV001470
                C              2.H3 IS ASSUMED TO BE A  ZERO MATRIX.                CAV001480
                C-------------------------------------------------------------------CAV001490
ISN 0072              BD1 = 0.0                                                     AV001500
ISN 0073              BD2 = 0.0                                                     AV001510
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ISN 0074            BD3 = 0.0                                                    AV001520
ISN 0075           DO 50 I = 1,NSET                                              AV001530
ISN 0076             IAS = ISET(I)                                               AV001540
ISN 0077             IF (CLASS1(IAS).EQ.0) GO TO 50                              AV001550
ISN 0079             BMATRX = VDACES(IAS) * HMAT(I)                              AV001560
ISN 0080             IF (BMATRX.EQ.0) STOP 30050                                 AV001570
ISN 0082             BD1 = BD1 + HMAT(I)     / BMATRX  * HRATYR(IAS)             AV001580
ISN 0083             BD2 = BD2 + HMAT(I)     / BMATRX  * HMAT(I)                 AV001590
ISN 0084             BD3 = BD3 + HRATYR(IAS)/ BMATRX  * HRATYR(IAS)              AV001600
ISN 0085        50 CONTINUE                                                      AV001610
                C                                                                AV001620
ISN 0086             EHIS = 0.0                                                  AV001630
ISN 0087             EHE  = 0.0                                                  AV001640
ISN 0088           DO 60 I = 1,NSET                                              AV001650
ISN 0089             IAS  = ISET(I)                                              AV001660
ISN 0090             EHIS = EHIS + HRATYR(IAS)                                   AV001670
ISN 0091             EHE  = EHE  + HMAT(I)                                       AV001680
ISN 0092        60 CONTINUE                                                      AV001690
                C*****************************************************************CAV001700
                C   FINAL CALCULATION OF AVOPT FOR THIS SET OF ACREAGE STRATA.    CAV001710
                C*****************************************************************CAV001720
ISN 0093             IF (BD3.EQ.0) STOP 30061                                    AV001730
ISN 0095             VOPT = (EHIS - BD1)**2 / BD3 - BD2 + EHE                    AV001740
                C                                                                AV001750
ISN 0096             IF (IOUT.EQ.5) WRITE(6,980) BD1,BD2,BD3                     AV001760
ISN 0098             IF (IOUT.EQ.5) WRITE(6,990) EHIS,EHE                        AV001770
ISN 0100             IF (IOUT.EQ.5) WRITE(6,991) (HISGAM(I),I=1,NYRS1H)          AV001780
                C-----------------------------------------------------------------CAV001790
                C    CHECKING TO SEE IF :  X0VECTOR'* HIST_1 = E'* H.            CAV001800
                C-----------------------------------------------------------------CAV001810
ISN 0102             X0HIS1 = 0.0                                                AV001820
ISN 0103             DO 70 I = 1,NSET                                            AV001830
ISN 0104               IAS = ISET(I)                                             AV001840
ISN 0105               IF (CLASS1(IAS).EQ.0) GO TO 70                            AV001850
ISN 0107               BMATRX = VDACES(IAS) * HMAT(I)                            AV001860
ISN 0108               IF (BMATRX.EQ.0) STOP 30070                               AV001870
ISN 0110               X0HIS1 = X0HIS1 + ((EHIS-BD1) / BD3 * HRATYR(IAS) /BMATRX AV001880
                     #                 + HMAT(I) / BMATRX                ) * HRATYR(IAS)AV001890
ISN 0111          70 CONTINUE                                                    AV001900
ISN 0112             IF (EHIS.EQ.0) STOP 30071                                   AV001910
ISN 0114             CHECK = (X0HIS1 - EHIS) / EHIS                              AV001920
ISN 0115             IF (ABS(CHECK).GT.1.0E-4) WRITE(6,902) X0HIS1,EHIS          AV001930
                C-----------------------------------------------------------------AV001940
ISN 0117             IF (VOPT.LE.0) WRITE(6,901)                                 AV001950
ISN 0119          900 RETURN                                                     AV001960
ISN 0120          901 FORMAT(1H0,'WARNING : A NEGATIVE VARIANCE WAS FOUND IN THE GROUPINAV001970
                     #G.',/,3X,' (GROUPING SEARCH CONTINOUS BUT SKIPPING THIS GROUP COM-AV001980
                     #BINATION)')                                                AV001990
ISN 0121          902 FORMAT(3X,'E R R O R: CHECKING X0 VECTOR : X0*HIST1 IS NOT EQUAL TAV002000
                     #O E*HIST.',/,32X,F12.4,3X,'~=',5X,F12.4)                   AV002010
ISN 0122          980 FORMAT(2X,'BD1 BD2 BD3 = ',3(E15.8,2X))                    AV002020
ISN 0123          990 FORMAT(2X,'EHIS =',F14.5,2X,' EHE (SUM OF H MATRX) =',E15.8)AV002030
ISN 0124          991 FORMAT(2X,'HISTORICAL GAMMAS = ',9F8.4)                    AV002040
ISN 0125              END                                                        AV002050
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS																		
I	0021	0022	0028	0029	0043	0044	0057	0058	0070	0075	0076	0079	0082	0083	0083	0088	0089	0091	0100
	0100	0100	0103	0104	0107	0110													
B1	0066	0068	0070																
B2	0061	0063	0070																
D2	0047	0051																	
EP	0046	0047	0048	0048															
T2	0059	0060	0070																
X1	0060	0061	0063	0063	0063	0065													
ABS	0115																		
BD1	0072	0082	0082	0095	0096	0110													
BD2	0073	0083	0083	0095	0096														
BD3	0074	0084	0084	0093	0095	0096	0110												
BOT	0027	0031	0031	0033	0037	0038													
EHE	0087	0091	0091	0095	0098														
GAP	0003	0005	0035	0037	0061	0063	0066	0068											
GX1	0065	0066	0068	0068	0068														
IAS	0013	0014	0029	0030	0031	0044	0046	0046	0047	0047	0051	0058	0059	0070	0070	0070	0076	0077	0079
	0082	0084	0084	0089	0090	0104	0105	0107	0110	0110									
NAS	0005																		
TOP	0026	0030	0030	0037	0038														

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS																
BVAR	0048	0049	0051														
CGAM	0024	0037	0065														
EHIS	0086	0090	0090	0095	0098	0110	0112	0114	0114	0115							
HHAT	0002	0008	0015	0022	0070	0079	0082	0083	0083	0091	0107	0110					
IDSR	0007																
IOUT	0005	0096	0098	0100													
ISET	0002	0002	0013	0018	0029	0044	0058	0076	0089	0104							
JOIN	0004	0005															
NARB	0005																
NSET	0002	0008	0008	0009	0011	0018	0019	0021	0028	0043	0053	0055	0055	0057	0075	0088	0103
VOPT	0002	0014	0095	0117													
AVOPT	0002																
CGAMK	0025	0038	0070	0070													
CHECK	0114	0115															
DACES	0007	0030															
ICROP	0005																
KYEAR	0042	0045	0046	0047													
KYRM1	0045	0046															
TAREA	0007	0046	0047	0051	0059	0070											
THETA	0041	0051	0051	0053	0055	0055	0059										
VARTY	0007																
ARBSET	0004	0005															
BMATRX	0079	0080	0082	0083	0084	0107	0108	0110	0110								
CLASS1	0006	0007	0077	0105													
HGAMMA	0018																
HISGAM	0008	0018	0046	0100													
HRATYR	0007	0031	0070	0070	0082	0084	0084	0090	0110	0110							
HSACRE	0007	0046	0047														
IDYLSR	0007																
ISCALE	0005																
IUNITS	0005																
NHSYRS	0005																
NYRS1H	0005	0039	0042	0055	0100												
RATOYR	0003	0005															
VARESY	0007																
VDACES	0007	0014	0079	0107													
XOHIS1	0102	0110	0110	0114	0115												
YLDEST	0007																

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES	
1	0017	0011	
10	0023	0021	
20	0032	0028	
30	0052	0042	0043
40	0071	0057	
50	0085	0075	0077
60	0092	0088	
70	0111	0103	0105
900	0119		
901	0120	0117	
902	0121	0115	
980	0122	0096	
990	0123	0098	
991	0124	0100	

/ AVOPT / SIZE OF PROGRAM 000A68 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I SF		I*4	000220	A1 SF		R*4	000224	A2 SF		R*4	000228	D2 SF		R*4	00022C
EP SF		R*4	000230	T2 SF		R*4	000234	X1 SF		R*4	000238	BD1 SF		R*4	00023C
BD2 SF		R*4	000240	BD3 SF		R*4	000244	BDT SF		R*4	000248	EHE SF		R*4	00024C
GAP F	C	I*4	000010	GX1 SF		R*4	000250	IAS SF		I*4	000254	NAS	C	I*4	NR
TOP SF		R*4	000258	BVAR SF		R*4	00025C	CGAM SF		R*4	000260	EHIS SF		R*4	000264
HHAT SF	XR	R*4	000000	IDSR	C	I*4	NR	IOUT	C	I*4	0211F4	ISET SFA	XR	I*4	000000
JOIN	C	I*2	NR	NARB	C	I*4	NR	NSET SFA		I*4	000268	VOPT S		R*4	00026C
AVOPT		R*4	000270	CGAMK SF		R*4	000274	CHECK S A		R*4	000278	DACES F	C	R*4	000BB8
ICROP	C	I*4	NR	KYEAR SF		I*4	00027C	KYRM1 SF		I*4	000280	TAREA F	C	R*4	001388
THETA SF		R*4	000284	VARTY	C	R*4	NR	FRXPI#	XF	R*4	000000	FRXPR#	XF	R*4	000000
ARBSET	C	I*2	NR	BMATRX SF		R*4	000288	CLASS1	C	I*4	0007D0	HGAMMA SF	XF		000000
HISGAM SFA		R*4	000290	HRATYR F	C	R*4	004A38	HSACRE F	C	R*4	002328	IBCOM#	XF	I*4	000000
IDYLSR	C	I*4	NR	ISCALE	C	I*4	NR	IUNITS	C	I*4	NR	NHSYRS	C	I*4	NR
NYRS1H F	C	I*4	000008	RATOYR	C	I*4	NR	VARESY	C	R*4	NR	VDACES F	C	R*4	000FA0

X0HIS1 SF R*4 00028C YLDEST C R*4 NR

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * PARAM* SIZE OF BLOCK 0211F8 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NAS	I*4	000000 NR	NHSYRS	I*4	000004 NR	NYRS1H	I*4	000008	RATOYR	I*4	00000C NR
GAP	I*4	000010	ISCALE	I*4	000014 NR	IUNITS	I*4	000018 NR	ICROP	I*4	000158 NR
JOIN	I*2	000298 NR	NARB	I*4	01EAE0 NR	ARRSET	I*2	01EAE4 NR	IOUT	I*4	0211F4

NAME OF COMMON BLOCK * DATA* SIZE OF BLOCK 004E20 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
IDSR	I*4	000000 NR	IOYLSR	I*4	0003E8 NR	CLASS1	I*4	0007D0	DACES	R*4	000BB8
VDACES	R*4	000FA0	TAREA	R*4	001388	YLDEST	R*4	001770 NR	VARTY	R*4	001B58 NR
VARESY	R*4	001F40 NR	HSACRE	R*4	002328	HRATYR	R*4	004A38			

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
1	17	00036E	10	23	0003A0	20	32	0003F6	30	52	000544
40	71	0006C4	50	85	000790	60	92	0007DA	70	111	00095E
900	119	0009E0									

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	0002F8	100002	10	00031A	100003	11	000328	100004	13	000330
100005	20	000382	100006	21	000390	100007	22	000392	100008	24	0003AA
100009	29	0003C0	100010	33	000400	100011	34	000406	100012	35	000414
100013	36	00041E	100014	37	00042C	100015	40	000478	100016	41	000486
100017	43	000496	100018	44	000498	100019	50	000514	100020	51	000522
100021	53	00054E	100022	53	000560	100023	54	000568	100024	55	000570
100025	56	000578	100026	57	000580	100027	58	0005B2	100028	62	0005E8
100029	63	000600	100030	64	00060C	100031	65	00062A	100032	67	00063E
100033	68	000656	100034	69	000662	100035	70	000680	100036	72	0006CE
100037	76	0006E0	100038	79	000702	100039	81	000722	100040	82	000730
100041	86	00079A	100042	89	0007A8	100043	93	0007E4	100044	94	0007EE
100045	95	0007FC	100046	97	000826	100047	98	000854	100048	99	000864
100049	100	000888	100050	101	000898	100053	102	0008C8	100054	104	0008D2
100055	107	0008F4	100056	109	000914	100057	110	000922	100058	112	0009E0
100059	113	000972	100060	114	000980	100061	116	00099A	100062	117	0009C0
100063	118	0009CA									

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
901	120	000028	902	121	0000AD	980	122	000104	990	123	000120
991	124	00014D									

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 124, PROGRAM SIZE = 2664, SUBPROGRAM NAME = AVOPT

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 205K BYTES OF CORE NOT USED

REQUESTED OPTIONS:

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

```
ISN 0002        SUBROUTINE CHECK1                                                CHE00010
               C-------------------------------------------------------------------CCHE00020
               CC                                                                  CCHE00030
               CC  S U B R O U T I N E                                             CCHE00040
               CC  -------------------                                             CCHE00050
               CC      CHECK1                                                      CCHE00060
               CC                                                                  CCHE00070
               CC  H I S T O R Y                                                   CCHE00080
               CC  -------------                                                   CCHE00090
               CC      PROGRAMMER ..,.......... PATRICK BROWN ,LEMSCO ,5/15/81     CCHE00100
               CC                                                                  CCHE00110
               CC  P U R P O S E                                                   CCHE00120
               CC  -------------                                                   CCHE00130
               CC      THIS SUBROUTINE PRINTS OUT VALUES OF VARIABLES SET IN THE   CCHE00140
               CC  CONTROL CARD. SOME OF INFORMATION IN EACH RECORD OF THE DATA    CCHE00150
               CC  FILE AND THE JOIN AND ARBSET MATRICES.  THIS OUTPUT APPEARS     CCHE00160
               CC  ONLY WHEN IOUT EQUALS 2.                                        CCHE00170
               CC                                                                  CCHE00180
               CC  SURROUTINES REQUIRED                                            CCHE00190
               CC  --------------------                                            CCHE00200
               CC     NONE                                                         CCHE00210
               CC                                                                  CCHE00220
               CC  R E M A R K S                                                   CCHE00230
               CC  -------------                                                   CCHE00240
               CC     THIS OUTPUT IS FOR CHECKING AND DEBUGGING THE INPUT.  TO     CCHE00250
               CC     OBTAIN THIS, ENTER THE KEYWORD   CHECK OUT   IN THE CONTROL  CCHE00260
               CC     CARD FILE WITH THE VALUE OF 2 ANYWHERE IN COLUMN 11 THROUGH 80.CCHE00270
               C-------------------------------------------------------------------CCHE00280
ISN 0003        INTEGER  RATOYR ,GAP                                             CHE00290
ISN 0004        INTEGER*2  JOIN, ARBSET                                          CHE00300
ISN 0005        COMMON /PARAM/NAS          ,NHSYRS      ,NYRS1H      ,          CHE00310
               #             RATOYR        ,GAP                      ,          CHE00320
               #             ISCALE        ,IUNITS(80)  ,ICROP(80)   ,          CHE00330
               #             JOIN(250,250) ,NARB        ,ARBSET(20,250),         CHE00340
               #             IOUT                                                CHE00350
               C                                                                  CHE00360
ISN 0006        INTEGER  CLASS1                                                  CHE00370
ISN 0007        COMMON /DATA/ IDSR(250)    ,IDYLSR(250)                 ,        CHE00380
               #             CLASS1(250)                                         CHE00390
               #             DACES(250)    ,VDACES(250) ,TAREA(250)     ,        CHE00400
               #             YLDEST(250)   ,VARTY(250)  ,VARESY(250)    ,        CHE00410
               #             HSACRE(250,10) ,HRATYR(250)                         CHE00420
               C  ********************PROGRAM BEGINS*****************************CHE00430
               CC                                                                 CHE00440
               CC  WRITE OUT USER INFORMATION                                     CHE00450
               CC                                                                 CHE00460
ISN 0008        WRITE(6, 910) (ICROP(J), J = 11,80)                              CHE00470
ISN 0009        WRITE(6, 920)  (IUNITS(J), J = 11, 80)                           CHE00480
ISN 0010        WRITE(6, 925) ISCALE                                             CHE00490
               C                                                                  CHE00500
               CC  WRITE HEADER LINE AND VALUES FROM DATA FILE.                   CHE00510
               CC                                                                 CHE00520
ISN 0011        WRITE(6, 927)                                                    CHE00530
ISN 0012        DO 30  IAS = 1, NAS                                              CHE00540
ISN 0013           WRITE(6,930) IDSR(IAS), DACES(IAS), YLDEST(IAS),(HSACRE(IAS,J) CHE00550
               1    , J = 1, NHSYRS)                                            CHE00560
ISN 0014     30  CONTINUE                                                       CHE00570
               C                                                                  CHE00580
               CC  WRITE OUT THE JOIN MATRIX                                      CHE00590
               CC                                                                 CHE00600
ISN 0015        DO 40 IAS = 1,NAS                                                CHE00610
ISN 0016          WRITE(6,940)  ( JOIN(IAS,J), J = 1, NAS)                       CHE00620
ISN 0017     40  CONTINUE                                                       CHE00630
               C                                                                  CHE00640
               CC  WRITE OUT VALUES FROM THE CONTROL CARD FILE.                   CHE00650
               C                                                                  CHE00660
ISN 0018        WRITE (6,950)                                                    CHE00670
ISN 0019        WRITE(6, 960) NAS,NHSYRS,NYRS1H,RATOYR,GAP, ISCALE, NARB, IOUT   CHE00680
               C                                                                  CHE00690
               CC  WRITE OUT THE ARBSET MATRIX                                    CHE00700
               C                                                                  CHE00710
ISN 0020        DO 50 IAS = 1,NARB                                               CHE00720
ISN 0021          WRITE(6,970)  ( ARBSET(IAS,J), J = 1, NAS )                    CHE00730
```

```
   ISN 0022        50  CONTINUE                                                    CHE00740
   ISN 0023            RETURN                                                      CHE00750
                C------------------------------------------------------------------CCHE00760
                C       F O R M A T S                                              CCHE00770
                C------------------------------------------------------------------CCHE00780
   ISN 0024        910  FORMAT('1THE CROP IS: ',80A1)                              CHE00790
   ISN 0025        920  FORMAT(' THE UNITS FOR AREA AND PRODUCTION ARE:',80A1)     CHE00800
   ISN 0026        925  FORMAT(' THE SCALE FACTOR IS ', I6)                        CHE00810
   ISN 0027        927  FORMAT(/, 1H ,' IDSR',6X,'DACES',4X,'YLDEST',5X,'HISTORICAL',  CHE00820
                       1' AGREAGE')                                               CHE00830
   ISN 0028        930  FORMAT(1X, I5, 2X, F9.2, 2X, F8.3, 2X, 10(F9.3) )          CHE00840
   ISN 0029        940  FORMAT(1X,132I1)                                           CHE00850
   ISN 0030        950  FORMAT('     NAS NHSYRS NYRS1H RATOYR  GAP ISCALE NARB  IOUT ')  CHE00860
   ISN 0031        960  FORMAT(1X, 8I6)                                            CHE00870
   ISN 0032        970  FORMAT(1X,132I1)                                           CHE00880
   ISN 0033             END                                                        CHE00890
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS													
J	0008	0008	0008	0009	0009	0013	0013	0013	0016	0016	0016	0021	0021	0021
GAP	0003	0005	0019											
IAS	0012	0013	0013	0013	0013	0015	0016	0020	0021					
NAS	0005	0012	0015	0016	0019	0021								
IDSR	0007	0013												
IOUT	0005	0019												
JOIN	0004	0005	0016											
NARB	0005	0019	0020											
DACES	0007	0013												
ICROP	0005	0008												
TAREA	0007													
VARTY	0007													
ARBSET	0004	0005	0021											
CHECK1	0002													
CLASS1	0006	0007												
HRATYR	0007													
HSACRE	0007	0013												
IDYLSR	0007													
ISCALE	0005	0010	0019											
IUNITS	0005	0009												
NHSYRS	0005	0013	0019											
NYRS1H	0005	0019												
RATOYR	0003	0005	0019											
VARESY	0007													
VDACES	0007													
YLDEST	0007	0013												

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES
30	0014	0012
40	0017	0015
50	0022	0020
910	0024	0008
920	0025	0009
925	0026	0010
927	0027	0011
930	0028	0013
940	0029	0014
950	0030	0018
960	0031	0019
970	0032	0021

/ CHECK1 / SIZE OF PROGRAM 0003DE HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
J F		I*4	000198	GAP F	C	I*4	000010	IAS SF		I*4	00019C	NAS F	C	I*4	000000
IDSR F	C	I*4	000000	IOUT F	C	I*4	0211F4	JOIN F	C	I*2	000298	NARB F	C	I*4	01EAE0
DACES F	C	R*4	0008B8	ICROP F	C	I*4	000158	TAREA	C	R*4	NR	VARTY	C	R*4	NR
ARBSET F	C	I*2	01EAE4	CHECK1		R*4	0001A0	CLASS1	C	I*4	NR	HRATYR	C	R*4	NR
HSACRE F	C	R*4	002328	IBCOM# F	XF	I*4	000000	IDYLSR	C	I*4	NR	ISCALE F	C	I*4	000014
IUNITS F	C	I*4	000018	NHSYRS F	C	I*4	000004	NYRS1H F	C	I*4	000008	RATOYR F	C	I*4	00000C
VARESY	C	R*4	NR	VDACES	C	R*4	NR	YLDEST F	C	R*4	001770				

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * PARAM* SIZE OF BLOCK 0211F8 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NAS	I*4	000000	NHSYRS	I*4	000004	NYRSIH	I*4	000008	RATOYR	I*4	00000C
GAP	I*4	000010	ISCALE	I*4	000014	IUNITS	I*4	000018	ICROP	I*4	000158
JOIN	I*2	000298	NARB	I*4	01EAE0	ARBSET	I*2	01EAE4	IOUT	I*4	0211F4

NAME OF COMMON BLOCK * DATA* SIZE OF BLOCK 004E20 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
IDSR	I*4	000000	IDYLSR	I*4	0003E8 NR	CLASS1	I*4	0007D0 NR	DACES	R*4	000BB8
VDACES	R*4	000FA0 NR	TAREA	R*4	001388 NR	YLDEST	R*4	001770	VARTY	R*4	001858 NR
VARESY	R*4	001F40 NR	HSACRE	R*4	002328	HRATYR	R*4	004A38 NR			

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
30	14	0002C0	40	17	000302	50	22	0003A2			

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	0001C4	100006	13	00025E	100009	15	0002CA	100010	16	0002CC
100013	18	00030C	100014	21	00037A	100017	23	0003BC			

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
910	24	000028	920	25	00003E	925	26	00006D	927	27	000088
930	28	0000C0	940	29	0000D8	950	30	0000E0	960	31	000118
970	32	000120									

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 32, PROGRAM SIZE = 990, SUBPROGRAM NAME =CHECK1

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 225K BYTES OF CORE NOT USED

REQUESTED OPTIONS:

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

```
ISN 0002            SUBROUTINE EST2                                                    EST00010
                   I (              IMASK,                                             EST00020
                   O                                AREA,AMSPE  ,PROC,PMSPE  )        EST00030
                C-------------------------------------------------------------------C EST00040
                C                                                                   C CEST00050
                C  S U B R O U T I N E                                              C CEST00060
                C  -------------------                                              C CEST00070
                C      EST2                                                         C CEST00080
                C                                                                   C CEST00090
                C  H I S T O R Y                                                    C CEST00100
                C  -------------                                                    C CEST00110
                C      PROGRAMMER ..... GARY W. SHAW .LEMSCO .5/15/81               C CEST00120
                C                                                                   C CEST00130
                C  P U R P O S E                                                    C CEST00140
                C  -------------                                                    C CEST00150
                C      TO CALCULATE THE ACREAGE AND PRODUCTION ESTIMATES ALONG WITH C CEST00160
                C   THEIR MEAN SQUARE PREDICTION ERROR FOR ANY GIVEN SET OF ACREAGE C CEST00170
                C   STRATA.                                                         C CEST00180
                C                                                                   C CEST00190
                C  SUBROUTINES REQUIRED                                             C CEST00200
                C  --------------------                                             C CEST00210
                C       NONE                                                        C CEST00220
                C                                                                   C CEST00230
                C  R E M A R K S                                                    C CEST00240
                C  -------------                                                    C CEST00250
                C                                                                   C CEST00260
                C      THE IMASK INPUTTED VECTOR IS NAS LONG AND INDICATES(=1) THE  CEST00270
                C  STRATA OF THE TOTAL NAS STRATA THAT BELONGS TO A GIVEN SET OF    CEST00280
                C  ACREAGE STRATA:                                                  CEST00290
                C        A SET  BEING:(1) A STATE                                   CEST00300
                C                     (2) THE ENTIRE REGION OF THE DATA SET         CEST00310
                C                     (3) AN ARBRITARY COLLECTION OF STRATA         CEST00320
                C                                                                   C CEST00330
                C-------------------------------------------------------------------C EST00340
ISN 0003            INTEGER  RATOYR ,GAP                                            EST00350
ISN 0004            INTEGER*2  JOIN, ARBSET                                         EST00360
ISN 0005            COMMON /PARAM/NAS             ,NHSYRS       ,NYRSIH         ,  EST00370
                   #              RATOYR          ,GAP                          ,  EST00380
                   #              ISCALE          ,IUNITS(80)   ,ICROP(80)      ,  EST00390
                   #              JOIN(250,250)   ,NARB         ,ARBSET(20,250) ,  EST00400
                   #              IOUT                                            EST00410
                C                                                                   EST00420
ISN 0006            INTEGER  CLASS                                                  EST00430
ISN 0007            COMMON /DATA/ IDSR(250)       ,IDYLSR(250)                  ,  EST00440
                   #              CLASS(250)      ,                             ,  EST00450
                   #              DACES(250)      ,VDACES(250)  ,TAREA(250)     ,  EST00460
                   #              YLDEST(250)     ,VARTY(250)   ,VARESY(250)    ,  EST00470
                   #              HSACRE(250,10)  ,HRATYR(250)                    EST00480
                C                                                                   EST00490
ISN 0008            INTEGER GROUP                                                   EST00500
ISN 0009            COMMON /EST/ NGRPS            ,GROUP(250)   ,HMATRX(250)    ,  EST00510
                   #              BMATRX(250)     ,                             ,  EST00520
                   #              GAMMA(250)      ,XMATRX(250,250) ,XOC(250)    ,  EST00530
                   #              NUMYS           ,IYDSEQ(50)   ,IFIRST(50)     ,  EST00540
                   #              IYD(250)        ,XD(250)                        EST00550
                C-------------------------------------------------------------------C EST00560
                C  DIMENSIONS FOR LOCAL VARIABLES.                                  C EST00570
                C-------------------------------------------------------------------C EST00580
ISN 0010            INTEGER SSTAR                                                   EST00590
ISN 0011            DIMENSION XOC2(250)   ,XO(250)        ,EX(250)     ,SHR(50)  ,  EST00600
                   #          SSTAR(250)  ,RMATRX(50,250) ,IMASK(250)             EST00610
                C************** S U B R O U T I N E   STARTS ************************CEST00620
                C                                                                   CEST00630
                C  SETTING THE SSTAR VECTOR WHICH INDICATES(=1) ALL THE ACREAGE STRATA CEST00640
                C OF THE GROUPS THAT COVER THE ACREAGE STRATA THAT ARE GIVEN IN THE  CEST00650
                C INPUT VECTOR OF IMASK.                                            CEST00660
                C-------------------------------------------------------------------C EST00670
                                                                                    EST00680
ISN 0012            DO 8 I =1,NAS                                                   EST00690
ISN 0013              SSTAR(I) = 0                                                  EST00700
ISN 0014          8 CONTINUE                                                        EST00710
ISN 0015            DO 10 I = 1,NAS                                                 EST00720
ISN 0016              IF (IMASK(I).EQ.0)  GO TO 10                                  EST00730
ISN 0018              INGRP = GROUP(I)
```

```
ISN 0019            DO  9 J = 1,NAS                                          EST00740
ISN 0020              IF (GROUP(J).EQ.INGRP) SSTAR(J) = 1                    EST00750
ISN 0022          9 CONTINUE                                                 EST00760
ISN 0023         10 CONTINUE                                                 EST00770
C-------------------------------------------------------------------------C EST00780
C                                                                           C EST00790
C     CALCULATIONS :                                                        C EST00800
C                   1. ACREAGE ESTIMATE.                                    C EST00810
C                   2. MEAN SQUARE ERROR FOR THE ACREAGE ESTIMATE.          C EST00820
C                   3. PRODUCTION ESTIMATE.                                 C EST00830
C                   4. MEAN SQUARE ERROR FOR THE PRODUCTION ESTIMATE.       C EST00840
C                                                                           C EST00850
C-------------------------------------------------------------------------C EST00860
C 1(A).                                                                     C EST00870
C       CALCULATION OF C2(KGROUP), WHICH IS USED IN THE CALCULATION         C EST00880
C       OF THE X0 VECTOR.                                                   C EST00890
C       C2(.) IS TAKEN FOR EACH GROUP. THE SUMMATION IS TAKEN OVER          C EST00900
C       THE ACREAGE STRATA THAT ARE IN THE INTERSECTION OF THE KTH          C EST00910
C       GROUP AND THE SET IN WHICH ESTIMATIONS ARE BEING PERFORMED.         C EST00920
C-------------------------------------------------------------------------C EST00930
ISN 0024            DO 20 I =  1,NAS                                        EST00940
ISN 0025              X0C2(I) = 0                                           EST00950
ISN 0026         20 CONTINUE                                                EST00960
ISN 0027            DO 30 I = 1,NAS                                         EST00970
ISN 0028              IF (IMASK(I).EQ.0) GO TO 30                           EST00980
ISN 0030                KG      = GROUP(I)                                  EST00990
ISN 0031                X0C2(KG) = X0C2(KG) + HRATYR(I)                     EST01000
ISN 0032                IF (CLASS1(I).EQ.0) GO TO 30                        EST01010
ISN 0034                IF (BMATRX(I).EQ.0.0) STOP 12030                    EST01020
ISN 0036                  X0C2(KG) = X0C2(KG) - HRATYR(I) * HMATRX(I) / BMATRX(I)  EST01030
ISN 0037         30 CONTINUE                                                EST01040
C-------------------------------------------------------------------------C EST01050
C                                                                           C EST01060
C 1(B).                                                                     C EST01070
C       CALCULATION OF X0 VECTOR FOR THIS SET .                             C EST01080
C-------------------------------------------------------------------------C EST01090
ISN 0038            DO 40 I = 1,NAS                                         EST01100
ISN 0039             X0(I) = 0.0                                            EST01110
ISN 0040               IF (SSTAR(I).EQ.0) GO TO 40                          EST01120
ISN 0042                 KG      = GROUP(I)                                 EST01130
ISN 0043                 IF (CLASS1(I).EQ.0) GO TO 40                       EST01140
ISN 0045                 IF (X0C1(KG).EQ.0.0) STOP 12040                    EST01150
ISN 0047                 IF (BMATRX(I).EQ.0.0) STOP 12041                   EST01160
ISN 0049                  X0(I) = (X0C2(KG)/X0C1(KG)) * (HRATYR(I)/BMATRX(I))  EST01170
                                +IMASK(I) * HMATRX(I) / BMATRX(I)           EST01180
ISN 0050         40 CONTINUE                                                EST01190
C-------------------------------------------------------------------------C EST01200
C                                                                           C EST01210
C 1(C).                                                                     C EST01220
C       THE AREA ESTIMATE = X0 VECTOR * D VECTOR.                           C EST01230
C            NOTE: SINCE THE X0(I) VALUE IS ZERO FOR CORRESPONDING          C EST01240
C                  SSTAR(I)=0 ,THE MULTIPLICATION BY SSTAR IS               C EST01250
C                  UNNESSARY FOR CALCULATION PURPOSES, HOWEVER, WE          C EST01260
C                  INCLUDE IT HERE FOR CLARIFICATION.THAT IS STRATA         C EST01270
C                  ONLY IN SSTAR SHOULD BE INCLUDED IN THE SUMMATION.       C EST01280
C-------------------------------------------------------------------------C EST01290
ISN 0051            AREA = 0.0                                              EST01300
ISN 0052            DO 50 I = 1,NAS                                         EST01310
ISN 0053              AREA = AREA + X0(I) * DACES(I) * SSTAR(I)             EST01320
ISN 0054         50 CONTINUE                                                EST01330
C-------------------------------------------------------------------------C EST01340
C                                                                           C EST01350
C 2.                                                                        C EST01360
C       MEAN SQUARE PREDICTED ERROR FOR THE AREA ESTIMATE (AMSPE).          C EST01370
C            VA1 = IMASK(*) * H_MATRIX  * IMASK(*)                          C EST01380
C            VA4 = X0 * B_MATRIX * X0                                       C EST01390
C            VA6 = X0 * HI_MATRIX       * IMASK(*)                          C EST01400
C                                                                           C EST01410
C       AMSPE = VA1 + VA4 - 2*VA6                                           C EST01420
C-------------------------------------------------------------------------C EST01430
ISN 0055            VA1 = 0.0                                               EST01440
ISN 0056            VA4 = 0.0                                               EST01450
ISN 0057            VA6 = 0.0                                               EST01460
ISN 0058            DO 60 I = 1,NAS                                         EST01470
ISN 0059              VA1 = VA1 + HMATRX(I)                      * IMASK(I) EST01480
ISN 0060              VA4 = VA4 + X0(I) * BMATRX(I)  * X0(I)  * CLASS1(I) * SSTAR(I)  EST01490
ISN 0061              VA6 = VA6 + X0(I) * HMATRX(I)              * IMASK(I) EST01500
ISN 0062         60 CONTINUE                                                EST01510
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ISN 0063          AMSPE = VA1 + VA4 - 2.0 * VA6                                  EST01520
                C-------------------------------------------------------------CEST01530
                C                                                               CEST01540
                C 3.                                                            CEST01550
                C       PRODUCTION ESTIMATE.                                    CEST01560
                C            PROC  =  NU0' * X * D                              CEST01570
                C                     WHERE  NU0(I) = Y(I) * IMASK(I)           CEST01580
                C                     X * D  = XD VECTOR WHICH HAS BEEN CALCULATED.  CEST01590
                C-------------------------------------------------------------CEST01600
ISN 0064          PROC = 0.0                                                    EST01610
ISN 0065          DO 70 I =1,NAS                                                EST01620
ISN 0066            PROC = PROC + YLDEST(I) * XD(I) * IMASK(I)                  EST01630
ISN 0067       70 CONTINUE                                                      EST01640
                C-------------------------------------------------------------CEST01650
                C                                                               CEST01660
                C 4(A) (B) (C).                                                 CEST01670
                C              CALCULATION OF VECTORS FOR USE IN THE CALCULATION  CEST01680
                C              OF PRODUCTION MSE                                CEST01690
                C (A) V4 & V6  :EX VECTOR = NU0' * X MATRIX                     CEST01700
                C               WHERE THE NU0 VECTOR IS DEFINED ABOVE.          CEST01710
                C (B) V2       :SHR VECTOR.                                     CEST01720
                C (C) V5       :RR MATRIX.                                      CEST01730
                C-------------------------------------------------------------CEST01740
ISN 0068          DO  80 I = 1,NAS                                              EST01750
ISN 0069            EX(I) = 0.0                                                 EST01760
ISN 0070            DO  79 J = 1,NAS                                            EST01770
ISN 0071              IF (IMASK(J).EQ.0) GO TO 79                               EST01780
ISN 0073              EX(I) = EX(I) + YLDEST(J) * XMATRX(J,I)                   EST01790
ISN 0074       79   CONTINUE                                                    EST01800
ISN 0075       80 CONTINUE                                                     EST01810
                C                                                               EST01820
ISN 0076          DO 89 IYIELD = 1,NUMYS                                        EST01830
ISN 0077            SHR(IYIELD) = 0.0                                           EST01840
ISN 0078       89 CONTINUE                                                     EST01850
ISN 0079          DO  90 I = 1,NAS                                              EST01860
ISN 0080            IF (IMASK(I).EQ.0) GO TO  90                                EST01870
ISN 0082            IYIELD = IYD(I)                                             EST01880
ISN 0083            IF (IYIELD.GT.NUMYS) STOP 12109                             EST01890
ISN 0085            SHR(IYIELD)= SHR(IYIELD) + HRATYR(I) * GAMMA(I)             EST01900
ISN 0086       90 CONTINUE                                                     EST01910
                C                                                               EST01920
ISN 0087          DO 100 IYIELD = 1,NUMYS                                       EST01930
ISN 0088            DO 100 I = 1,NAS                                            EST01940
ISN 0089       100    RMATRX(IYIELD,I) = 0.0                                    EST01950
ISN 0090          DO 110 J = 1,NAS                                              EST01960
ISN 0091            IF (CLASS1(J).EQ.0 .OR. SSTAR(J).EQ.0)  GO TO 110           EST01970
ISN 0093            DO 109 I = 1,NAS                                            EST01980
ISN 0094              IF (SSTAR(I).EQ.0 .OR. IMASK(I).EQ.0) GO TO 109           EST01990
ISN 0096              IYIELD  = IYD(I)                                          EST02000
ISN 0097              RMATRX(IYIELD,J) = RMATRX(IYIELD,J) + XMATRX(I,J)         EST02010
ISN 0098       109  CONTINUE                                                    EST02020
ISN 0099       110 CONTINUE                                                    EST02030
                C-------------------------------------------------------------CEST02040
                C                                                               CEST02050
                C 4.                                                            CEST02060
                C     MEAN SQUARE ERROR FOR THE PRODUCTION ESTIMATE (PMSE).     CEST02070
                C          PMSE IS CALCULATED IN 6 COMPONENTS:                  CEST02080
                C                    V1 = NU0' * HMAT * NU0                     CEST02090
                C                    V2 = (GAMMA*HIS)' * (OMEGA+I) ** (GAMMA*HIS)  CEST02100
                C                    V3 = TRACE(HMAT * OMEGA)                   CEST02110
                C                    V4 = (NU0'*XMAT) * (SIGMA+HMAT1) * (NU0'*XMAT)'  CEST02120
                C                    V5 = TRACE(I * XMAT *(SIGMA+HMAT1)* XMAT')  CEST02130
                C                    V6 = NU0' * XMAT * (HMAT1*NU0_1)           CEST02140
                C-------------------------------------------------------------CEST02150
ISN 0100          V1 = 0.0                                                      EST02160
ISN 0101          V2 = 0.0                                                      EST02170
ISN 0102          V3 = 0.0                                                      EST02180
ISN 0103          V4 = 0.0                                                      EST02190
ISN 0104          V5 = 0.0                                                      EST02200
ISN 0105          V6 = 0.0                                                      EST02210
                C                                                               EST02220
                C CALCULATION OF V1 V3 V4 V6                                    EST02230
                C                                                               EST02240
ISN 0106          DO 120  I = 1,NAS                                             EST02250
ISN 0107            V1 = V1 + YLDEST(I) * HMATRX(I)* YLDEST(I)          * IMASK(I)EST02260
ISN 0108            V3 = V3 + HMATRX(I) * VARTY(I)                      * IMASK(I)EST02270
ISN 0109            V4 = V4 + EX(I)     * BMATRX(I)* EX(I)     * CLASS1(I) * SSTAR(I)EST02280
ISN 0110            V6 = V6 + EX(I)     * HMATRX(I)* YLDEST(I)* CLASS1(I) * IMASK(I)EST02290
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   ISN 0111        120 CONTINUE                                                    EST02300
                   C                                                               EST02310
                   C CALCULATION OF V2                                             EST02320
                   C                                                               EST02330
   ISN 0112              DO 130 IYIELD = 1,NUMYS                                   EST02340
   ISN 0113                I2 = IFIRST(IYIELD)                                     EST02350
   ISN 0114                V2 = V2 + (VARTY(I2) * VARESY(I2)) * SHR(IYIELD) **2    EST02360
   ISN 0115        130 CONTINUE                                                    EST02370
                   C                                                               EST02380
                   C CALCULATION OF V5                                             EST02390
                   C                                                               EST02400
   ISN 0116              DO 140 IYIELD = 1,NUMYS                                   EST02410
   ISN 0117                I2 = IFIRST(IYIELD)                                     EST02420
   ISN 0118                XBX    = 0.0                                            EST02430
   ISN 0119                DO 139 J = 1,NAS                                        EST02440
   ISN 0120                  IF ( CLASS(J).EQ.0 .OR. SSTAR(J).EQ.0) GO TO 139      EST02450
   ISN 0122                  XBX = XBX + BMATRX(J) * RMATRX(IYIELD,J) **2          EST02460
   ISN 0123        139     CONTINUE                                                EST02470
   ISN 0124                V5 = V5 + VARESY(I2) * XBX                              EST02480
   ISN 0125        140   CONTINUE                                                  EST02490
                   C-------------------------------------------------------------CEST02500
                   C         FINIAL   CALCULATION  OF  MSPE  FOR  PRODUCTION     CEST02510
                   C-------------------------------------------------------------CEST02520
                   C                                                               EST02530
   ISN 0126              PMSPE = V1 + V2 + V3 + V4 + V5 - 2.0*V6                   EST02540
                   C-------------------------------------------------------------CEST02550
   ISN 0127              RETURN                                                    EST02560
   ISN 0128              END                                                       EST02570
```

*****FORTRAN CROSS REFERENCE LISTING*****

SYMBOL	INTERNAL STATEMENT NUMBERS																		
I	0012	0013	0015	0016	0018	0024	0025	0027	0028	0030	0031	0032	0034	0036	0036	0036	0038	0039	0040
	0042	0043	0047	0049	0049	0049	0049	0049	0049	0052	0053	0053	0053	0058	0059	0059	0060	0060	0060
	0060	0060	0061	0061	0061	0065	0066	0066	0066	0068	0069	0073	0073	0073	0079	0080	0082	0085	0085
	0088	0089	0093	0094	0094	0096	0097	0106	0107	0107	0107	0107	0108	0108	0108	0109	0109	0109	0109
	0109	0110	0110	0110	0110	0110													
J	0019	0020	0020	0070	0071	0073	0073	0090	0091	0091	0097	0097	0097	0119	0120	0120	0122	0122	
EX	0011	0069	0073	0073	0109	0109	0110												
I2	0113	0114	0114	0117	0124														
KG	0030	0031	0031	0036	0036	0042	0045	0049	0049										
V1	0100	0107	0107	0126															
V2	0101	0114	0114	0126															
V3	0102	0108	0108	0126															
V4	0103	0109	0109	0126															
V5	0104	0124	0124	0126															
V6	0105	0110	0110	0126															
XD	0009	0066																	
XO	0011	0039	0049	0053	0060	0060	0061												
GAP	0003	0005																	
IYD	0009	0082	0096																
NAS	0005	0012	0015	0019	0024	0027	0038	0052	0058	0065	0068	0070	0079	0088	0090	0093	0106	0119	
SHR	0011	0077	0085	0085	0114														
VA1	0055	0059	0059	0063															
VA4	0056	0060	0060	0063															
VA6	0057	0061	0061	0063															
XBX	0118	0122	0122	0124															
AREA	0002	0051	0053	0053															
EST2	0002																		
IDSR	0007																		
IOUT	0005																		
JOIN	0004	0005																	
NARB	0005																		
PROC	0002	0064	0066	0066															
XOC1	0009	0045	0049																
XOC2	0011	0025	0031	0031	0036	0036	0049												
AMSPE	0002	0063																	
DACES	0007	0053																	
GAMMA	0009	0085																	
GROUP	0008	0009	0018	0020	0030	0042													
ICROP	0005																		
IMASK	0002	0011	0016	0028	0049	0059	0061	0066	0071	0080	0094	0107	0108	0110					
INGRP	0018	0020																	
NGRPS	0009																		
NUMYS	0009	0076	0083	0087	0112	0116													
PMSPE	0002	0126																	
SSTAR	0010	0011	0013	0020	0040	0053	0060	0091	0094	0109	0120								
TAREA	0007																		

*****FORTRAN CROSS REFERENCE LISTING*****

SYMBOL	INTERNAL STATEMENT NUMBERS																
VARTY	0007	0108	0114														
ARBSET	0004	0005															
BMATRX	0009	0034	0036	0047	0049	0049	0060	0109	0122								
CLASS1	0006	0007	0032	0043	0060	0091	0109	0110	0120								
HMATRX	0009	0036	0049	0059	0061	0107	0108	0110									
HRATYR	0007	0031	0036	0049	0085												
HSACRE	0007																
IDYLSR	0007																
IFIRST	0009	0113	0117														
ISCALE	0005																
IUNITS	0005																
IYDSEQ	0009																
IYIELD	0076	0077	0082	0083	0085	0085	0087	0089	0096	0097	0097	0112	0113	0114	0116	0117	0122
NHSYRS	0005																
NYRS1H	0005																
RATOYR	0003	0005															
RMATRX	0011	0089	0097	0097	0122												
VARESY	0007	0114	0124														
VDACES	0007																
XMATRX	0009	0073	0097														
YLDEST	0007	0066	0073	0107	0107	0110											

*****FORTRAN CROSS REFERENCE LISTING*****

LABEL	DEFINED	REFERENCES		
8	0014	0012		
9	0022	0019		
10	0023	0015	0016	
20	0026	0024		
30	0037	0027	0028	0032
40	0050	0038	0040	0043
50	0054	0052		
60	0062	0058		
70	0067	0065		
79	0074	0070	0071	
80	0075	0068		
89	0078	0076		
90	0086	0079	0080	
100	0089	0087	0088	
109	0098	0093	0094	
110	0099	0090	0091	
120	0111	0106		
130	0115	0112		
139	0123	0119	0120	
140	0125	0116		

/ EST2 / SIZE OF PROGRAM 00DE1E HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	000094	J	SF	I*4	000098	EX	SF	R*4	000108	I2	SF	I*4	00008C
KG	SF	I*4	0000C0	V1	SF	R*4	0000C4	V2	SF	R*4	0000C8	V3	SF	R*4	0000CC
V4	SF	R*4	0000D0	V5	SF	R*4	0000D4	V6	SF	R*4	0000D8	XO	SF	R*4	03E998
XO	SF	R*4	0004F0	GAP	C	I*4	NR	IYD	F C	I*4	03E5B0	NAS	F C	I*4	000000
SHR	SF	R*4	0008D8	VA1	SF	R*4	0000DC	VA4	SF	R*4	0000E0	VA6	SF	R*4	0008E4
XBX	SF	R*4	0000E8	AREA	SF	R*4	0000EC	EST2		R*4	0000F0	IDSR	C	I*4	NR
IOUT	C	I*4	NR	JOIN	C	I*2	NR	NARB	C	I*4	NR	PROC	SF	R*4	0000F4
XOC1	F C	R*4	03E034	XOC2	SF	R*4	0009A0	AMSPE	S	R*4	0000F8	DACES	F C	R*4	000B88
GAMMA	F C	R*4	000BBC	GROUP	F C	I*4	000004	ICROS	C	I*4	NR	IMASK	F XR	I*4	000008
INGRP	S	I*4	0000FC	NGRPS	C	I*4	NR	NUMYS	F C	I*4	03E41C	PMSPE	S	R*4	000100
SSTAR	SF	I*4	0000B8	TAREA	C	R*4	NR	VARTY	F C	R*4	001858	ARBSET	C	I*2	NR
BMATRX	F C	R*4	0007D4	CLASS1	F C	I*4	0007D0	HMATRX	F C	R*4	0003EC	HRATYR	F C	R*4	004A38
HSACRE	C	R*4	NR	IBCOM#	XF	R*4	000000	IDYLSR	C	I*4	NR	IFIRST	F C	I*4	03E4E8
ISCALE	C	I*4	NR	IUNITS	C	I*4	NR	IYDSEQ	C	I*4	NR	IYIELD	SF	I*4	000104
NHSYRS	C	I*4	NR	NYRS1H	C	I*4	NR	RATOYR	C	I*4	NR	RMATRX	SF	R*4	001174
VARESY	F C	R*4	001F40	VDACES	C	R*4	NR	XMATRX	F C	R*4	000FA4	YLDEST	F C	R*4	001770

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * PARAM* SIZE OF BLOCK 0211F8 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NAS	I*4	000000	NHSYRS	I*4	000004 NR	NYRS1H	I*4	000008 NR	RATOYR	I*4	00000C NR

GAP	I*4	000010 NR	ISCALE	I*4	000014 NR	IUNITS	I*4	000018 NR	ICROP	I*4	000158 NR	JOIN	I*2	000298 NR	NARB	I*4	01EAE0 NR	ARBSET	I*2	01EAE4 NR	IOUT	I*4	0211F4 NR

NAME OF COMMON BLOCK * DATA* SIZE OF BLOCK 004E20 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
IDSR	I*4	000000 NR	IDYLSR	I*4	0003E8 NR	CLASS1	I*4	0007D0	DACES	R*4	000BB8
VDACES	R*4	000FA0 NR	TAREA	R*4	001388 NR	YLOEST	R*4	001770	VARTY	R*4	001B58
VARESY	R*4	001F40	HSACRE	R*4	002328 NR	HRATYR	R*4	004A38			

NAME OF COMMON BLOCK * EST* SIZE OF BLOCK 03ED80 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NGRPS	I*4	000000 NR	GROUP	I*4	000004	HMATRX	R*4	0003EC	BMATRX	R*4	0007D4
GAMMA	R*4	0008BC	XMATRX	R*4	000FA4	XOC1	R*4	03E034	NUMYS	I*4	03E41C
IYDSEQ	I*4	03E420 NR	IFIRST	I*4	03E4E8	IYD	I*4	03E580	XD	R*4	03E998

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
8	14	00D528	9	22	00D574	10	23	00D57E	20	26	00D5A8
30	37	00D664	40	50	00D766	50	54	00D7B6	60	62	00D8A2
70	67	00D90A	79	74	00D970	80	75	00D97A	89	78	00D994
90	86	00DA0A	100	89	00DA18	109	98	00DADE	110	99	00DAE8
120	111	00DC66	130	115	00DC80	139	123	00DD2C	140	125	00DD52

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	00D500	100002	13	00D51A	100003	15	00D532	100004	16	00D534
100005	18	00D548	100006	20	00D558	100007	21	00D56A	100009	24	00D588
100010	25	00D58A	100011	27	00D582	100012	28	00D5B4	100013	30	00D5C8
100014	34	00D60A	100015	35	00D61A	100016	36	00D628	100017	38	00D66E
100018	39	00D670	100019	42	00D68E	100020	45	00D6B0	100021	46	00D6C2
100022	47	00D6D0	100023	48	00D6E0	100024	49	00D6EE	100025	51	00D770
100026	53	00D77A	100027	55	00D7C0	100028	59	00D7D2	100029	63	00D8AC
100030	65	00D8C6	100031	68	00D914	100032	69	00D916	100033	71	00D926
100034	73	00D93A	100036	76	00D984	100037	77	00D986	100038	79	00D9A2
100039	80	00D9A6	100040	82	00D988	100041	84	00D9CE	100042	85	00D9DC
100043	87	00DA14	100044	88	00DA16	100045	90	00DA3C	100046	90	00DA4A
100047	91	00DA4C	200001	92	00DA60	100048	93	00DA70	100049	94	00DA72
200002	95	00DA82	100050	96	00DA96	100052	100	00DAF2	100053	107	00DB10
100054	112	00DC70	100055	113	00DC72	100056	116	00DCBE	100057	117	00DCC0
100058	120	00DCDC	200003	121	00DCF0	100059	122	00DD00	100060	124	00DD36
100061	126	00DD60									

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 127, PROGRAM SIZE = 56862, SUBPROGRAM NAME = EST2

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ******* 201K BYTES OF CORE NOT USED

REQUESTED OPTIONS:

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

```
ISN 0002          SUBROUTINE FIND2                                                  FIN00010
                  I  (  G1   ,G2   ,GROUP    ,NAS  ,                               FIN00020
                  0                                  NSET ,ISET              )     FIN00030
                C-------------------------------------------------------------------CFIN00040
                C                                                                   CFIN00050
                C  S U B R O U T I N E                                              CFIN00060
                C  -------------------                                              CFIN00070
                C      FIND2                                                        CFIN00080
                C                                                                   CFIN00090
                C  H I S T O R Y                                                    CFIN00100
                C  -------------                                                    CFIN00110
                C      PROGRAMMER ............... GARY W. SHAW .LEMSCO .5/15/81   CFIN00120
                C                                                                   CFIN00130
                C  P U R P O S E                                                    CFIN00140
                C  -------------                                                    CFIN00150
                C      TO FIND THE INDEXES OF THE ACREAGE STRATA BELONGING TO TWO   CFIN00160
                C  ACREAGE STRATA GROUPS.                                           CFIN00170
                C                                                                   CFIN00180
                C  SUBROUTINES REQUIRED                                             CFIN00190
                C  --------------------                                             CFIN00200
                C      NONE                                                         CFIN00210
                C                                                                   CFIN00220
                C  R E M A R K S                                                    CFIN00230
                C  -------------                                                    CFIN00240
                C                                                                   CFIN00250
                C        IF WE HAVE AS INPUTS :                                     CFIN00260
                C          1:  G1:0    THEN ONLY G1 IS INCLUDED IN THE SET (ALSO 0.G2). CFIN00270
                C          2:  G1.G2   THEN BOTH G1 AND G2 ARE INCLUDED.           CFIN00280
                C                                                                   CFIN00290
                C      NSET =  THE NUMBER OF NON-ZERO ELEMENTS OF THE VECTOR ISET.  CFIN00300
                C              THE TOTAL NUMBER OF ACREAGE STRATA IN THIS NEW GROUP. CFIN00310
                C                                                                   CFIN00320
                C      ISET(I) = THE ABSOLUTE INDEX OF THE ITH ACREAGE STRATA .     CFIN00330
                C              = 0  IF THE ITH ACREAGE DOES NOT BELONG TO THIS      CFIN00340
                C                NEW GROUP.  ISET HAS DIMENSION 250 IN GRPING.      CFIN00350
                C-------------------------------------------------------------------CFIN00360
ISN 0003          DIMENSION   ISET(NSET)                                            FIN00370
ISN 0004          INTEGER   G1        ,G2   ,GROUP(NAS)                             FIN00380
                C*********************** SUBROUTINE STARTS ***************************CFIN00390
ISN 0005          NSET = 0                                                          FIN00400
ISN 0006          DO 10 I = 1,NAS                                                   FIN00410
ISN 0007            ISET(I) = 0                                                     FIN00420
ISN 0008       10 CONTINUE                                                        FIN00430
ISN 0009          DO 20 I = 1,NAS                                                   FIN00440
ISN 0010            IF (GROUP(I).NE.G1 .AND. GROUP(I).NE.G2)  GO TO 20              FIN00450
ISN 0012            NSET    = NSET + 1                                            FIN00460
ISN 0013            ISET(NSET) = I                                                  FIN00470
ISN 0014       20 CONTINUE                                                        FIN00480
                C                                                                   FIN00490
ISN 0015          IF (NSET.GT.0) GO TO 30                                           FIN00500
ISN 0017          WRITE(6,100)                                                      FIN00510
ISN 0018        100 FORMAT(' WARNING : A POTENTIAL GROUP WAS FOUND TO HAVE  0  MEMBERSFIN00520
                  *.', /, '       (VARIABLE NSET <= 0 IN SUBROUTINE FIND2 ) .  ')   FIN00530
ISN 0019       30 RETURN                                                          FIN00540
ISN 0020          END                                                               FIN00550
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS					
I	0006	0007	0009	0010	0010	0013
G1	0002	0004	0010			
G2	0002	0004	0010			
NAS	0002	0004	0006	0009		
*SET	0002	0003	0007	0013		
NSET	0002	0003	0005	0012	0012	0013	0015
FIND2	0002					
GROUP	0002	0004	0010	0010		

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES
10	0008	0006
20	0014	0009 0010

*****FORTRAN CROSS REFERENCE LISTING*****

LABEL	DEFINED	REFERENCES
30	0019	0015
100	0018	0017

/ FIND2 / SIZE OF PROGRAM 000246 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	000100	G1		I*4	000104	G2		I*4	000108	NAS	F	I*4	00010C
ISET	S XR	I*4	000000	NSET	SF	I*4	000110	FIND2		R*4	000114	GROUP	XF	I*4	000000
IBCOM#	F XF	I*4	000000												

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
10	8	00015E	20	14	000190	30	19	0001B4			

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	00012C	100002	7	000154	100003	9	000166	100004	10	000168
200001	11	000176	100005	12	000184	100006	15	000198	100007	17	00019E

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100	18	000028									

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(60) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 19, PROGRAM SIZE = 584, SUBPROGRAM NAME = FIND2

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 225K BYTES OF CORE NOT USED

REQUESTED OPTIONS:

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

```
ISN 0002            SUBROUTINE GRPING                                          GRP00010
                   0          (   NGRPS,  GROUP,   HMATRX )                   GRP00020
C-------------------------------------------------------------------------C GRP00030
C                                                                           C GRP00040
C  S U B R O U T I N E                                                      C GRP00050
C  -------------------                                                      C GRP00060
C      GRPING                                                               C GRP00070
C                                                                           C GRP00080
C  H I S T O R Y                                                            C GRP00090
C  -------------                                                            C GRP00100
C      PROGRAMMER ..... GARY W. SHAW .LEMSCO .5/15/81                       C GRP00110
C                                                                           C GRP00120
C  P U R P O S E                                                            C GRP00130
C  -------------                                                            C GRP00140
C                                                                           C GRP00150
C      TO DETERMINE THE OPTIMAL GROUPING OF THE ACREAGE STRATA.             C GRP00160
C      THE CRITERION OF THE GROUPING IS BASED ON THE ESTIMATES OF           C GRP00170
C  ACREAGE VARIANCE ASSOCIATED WITH THE GROUPS.                             C GRP00180
C                                                                           C GRP00190
C  SUBROUTINES REQUIRED                                                     C GRP00200
C  --------------------                                                     C GRP00210
C     FIND2   FINDS THE ACREAGE STRATA BELONGING TO COMBINED GROUPS.        C GRP00220
C                                                                           C GRP00230
C     AVOPT   CALCULATES VARIANCE OF ACREAGE AND H MATRIX                   C GRP00240
C             CORRESPONDING TO A COMBINED GROUP.                            C GRP00250
C                                                                           C GRP00260
C  R E M A R K S                                                            C GRP00270
C  -------------                                                            C GRP00280
C                                                                           C GRP00290
C  1)   THE SEARCH FOR THE GROUPS KEYS ON MINIMUM HISTORICAL ACREAGE        C GRP00300
C  OF THE ACREAGE STRATA FOR THE RATIO YEAR.                                C GRP00310
C                                                                           C GRP00320
C  2)   THE RETURNED INFORMATION IS CONTAINED IN THE VECTOR GROUP,          C GRP00330
C  WHICH HAS THE FOLLOWING  :                                               C GRP00340
C                      GROUP (I) = THE GROUP NUMBER TO WHICH THE ITH        C GRP00350
C                                  ACREAGE STRATUM IS ASSIGNED .            C GRP00360
C                                                                           C GRP00370
C  3)   ALSO THE H MATRIX WILL BE CALCULATED AND RECALCULATED AS THE        C GRP00380
C  GROUPING PROCEDURE CONTINUES. ON THE FINAL GROUPING, THE H MATRIX        C GRP00390
C  FOUND WILL BE SENT BACK TO THE MAIN TO BE USED IN THE ESTIMATION         C GRP00400
C  STEP OF THE GOAT ALGOTHRIM.                                              C GRP00410
C                                                                           C GRP00420
C-------------------------------------------------------------------------C GRP00430
ISN 0003            INTEGER    RATOYR  .GAP                                 GRP00440
ISN 0004            INTEGER*2  JOIN. ARBSET                                 GRP00450
ISN 0005            COMMON /PARAM/NAS          ,NHSYRS      ,NYRSIH      ,  GRP00460
                   #               RATOYR      ,GAP                      ,  GRP00470
                   #               ISCALE      ,IUNITS(80)  ,ICROP(80)   ,  GRP00480
                   #               JOIN(250,250) ,NARB      ,ARBSET(20,250),  GRP00490
                   #               IOUT                                      GRP00500
ISN 0006            COMMON /DATA/ IDSR(250)   ,IDYLSR(250)                ,  GRP00510
                   #               CLASSI(250)  ,                            GRP00520
                   #               DACES(250)   ,VDACES(250) ,TAREA(250)   ,  GRP00530
                   #               YLDEST(250)  ,VARIY(250)  ,VARESY(250)  ,  GRP00540
                   #               HSACRE(250,10) ,HRATYR(250)               GRP00550
ISN 0007            INTEGER    CLASSI                                       GRP00560
C-------------------------------------------------------------------------C GRP00570
C     DIMENSIONS FOR LOCAL VARIABLES                                        C GRP00580
C-------------------------------------------------------------------------C GRP00590
ISN 0008            DIMENSION  HMATRX(250)  ,HMAT(250)  ,GAMSPE(250)  ,     GRP00600
                   #           HTEST(250)   ,ISET(250), INDHX(250)  .       GRP00610
                   #           HXTEMP(250)                                   GRP00620
ISN 0009            INTEGER    ACTIVE(250)  ,GROUP(250)                     GRP00630
ISN 0010            DATA LINE /'----'/, SLINE /'*****'/                     GRP00640
C-------------------------------------------------------------------------C GRP00650
C   INITIALIZE EACH ACREAGE STRATUM TO BE A GROUP BY ITSELF.                C GRP00660
C-------------------------------------------------------------------------C GRP00670
ISN 0011            DO 1 I = 1,NAS                                          GRP00680
ISN 0012              GROUP(I) = I                                          GRP00690
ISN 0013          1 CONTINUE                                                GRP00700
C-------------------------------------------------------------------------C GRP00710
C INITIALIZE THE GROUP ACREAGE MSPE (GAMSPE)                                C GRP00720
C           AND THE H MATRIX (HMATRX).                                      C GRP00730
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                C   NOTE :  ASSUMING ONLY ONE ACREAGE STRATUM PER GROUP. THE MSPE      CGRP00740
                C          SIMPLIFIES TO BE THE VARIANCE OF THE DIRECT ACREAGE       CGRP00750
                C          ESTIMATE(VDACES) . IF THE ITH ACREAGE STRATA IS CLASS 1.  CGRP00760
                C          THE H MATRIX ELEMENTS ARE ZERO IN THIS CASE.              CGRP00770
                C-----------------------------------------------------------------CGRP00780
ISN 0014              DO 5 I = 1,NAS                                                GRP00790
ISN 0015                HMATRX(I) = 0.0                                             GRP00800
ISN 0016                GAMSPE(I) = 0.0                                             GRP00810
ISN 0017                IF (CLASS1(I).EQ.1) GAMSPE(I) = VDACES(I)                   GRP00820
ISN 0019              5 CONTINUE                                                    GRP00830
                C-----------------------------------------------------------------CGRP00840
                C INITIALIZE THE VECTOR HTEST TO BE THE HISTORICAL ACREAGE FOR EACH CGRP00850
                C          ACREAGE STRATA (CLASS1 OR CLASS2).                     CGRP00860
                C                                                                 CGRP00870
                C     NOTE : THE VECTOR HTEST WILL BE THE PRIMARY VECTOR THAT WILL CGRP00880
                C            BE KEYED ON INORDER TO GROUP THE ACREAGE STRATA.     CGRP00890
                C                                                                 CGRP00900
                C            WHEN TWO ACREAGE STRATA (GROUPS) ARE COMBINED, THEN THE CGRP00910
                C            TWO HISTORICAL ACREAGE VALUES ARE ADDED AND THE RESULT CGWP00920
                C            IS STORED IN ONE OF THE HTEST ELEMENTS (THE OTHER ELEMENT CGRP00930
                C            IS SET TO ZERO).                                     CGRP00940
                C-----------------------------------------------------------------CGRP00950
ISN 0020              DO 10 I = 1,NAS                                               GRP00960
ISN 0021                HTEST(I) = HRATYR(I)                                        GRP00970
ISN 0022             10 CONTINUE                                                    GRP00980
                C-----------------------------------------------------------------CGRP00990
                C   INITIALIZE THE VECTOR ACTIVE TO ONES, WHICH INDICATES ALL ACREAGE CGRP01000
                C             STRATA ARE INITIALLY ACTIVE.                        CGRP01010
                C-----------------------------------------------------------------CGRP01020
ISN 0023              DO 20 I = 1,NAS                                               GRP01030
ISN 0024                ACTIVE(I) = 1                                               GRP01040
ISN 0025             20 CONTINUE                                                    GRP01050
                C-----------------------------------------------------------------CGRP01060
                C  TEST TO SEE IF THERE ARE ANY CLASS 2 ACREAGE STRATA.           CGRP01070
                C  IF THERE ARE NONE (NUMII=0) THEN THE FIRST SECTION (STMT 35 TO 150) CGRP01080
                C  OF THIS ROUTINE IS SKIPPED.                                    CGRP01090
                C-----------------------------------------------------------------CGRP01100
ISN 0026              NUMII = 0                                                     GRP01110
ISN 0027              DO 30 I = 1,NAS                                               GRP01120
ISN 0028                IF (CLASS1(I).EQ.0) NUMII = NUMII + 1                       GRP01130
ISN 0030             30 CONTINUE                                                    GRP01140
                C-----------------------------------------------------------------CGRP01150
                C       IF IN FACT NUMII IS POSTIVE THEN THERE ARE CLASS2 ACREAGE  CGRP01160
                C  STRATA THAT WILL BE PROCESSED FIRST BEFORE THE CLASS1 STRATA   CGRP01170
                C  ARE PROCESSED.                                                 CGRP01180
                C-----------------------------------------------------------------CGRP01190
ISN 0031              IF (NUMII.EQ.0) GO TO 150                                     GRP01200
                C-----------------------------------------------------------------CGRP01210
                C    INITIALIZE THE NUMBER OF ISOLATED CLASS2 STRATA (ISOLAT) TO THE CGRP01220
                C              THE TOTAL NUMBER OF CLASS2 STRATA. THE NUMBER OF   CGRP01230
                C              ISOLATED CLASS2 MUST BE ZERO BEFORE THE PROCEDURE  CGRP01240
                C              CAN CONTINUE AT ALL.                               CGRP01250
                C              NOTE : ALL CLASS2 STRATA ARE CONSIDERED TO BE ISOLATED CGRP01260
                C                     UNTIL THEY ARE COMBINED WITH A CLASS1.      CGRP01270
                C-----------------------------------------------------------------CGRP01280
ISN 0033              ISOLAT = NUMII                                                GRP01290
                C*****************************************************************CGRP01300
                C*****************  BEGIN    CLASS2    SEARCH  *******************CGRP01310
                C*****************************************************************CGRP01320
ISN 0034              IF (IOUT.EQ.5 .OR. IOUT.EQ.6) WRITE(6,9035)                   GRP01330
ISN 0036             35 CONTINUE                                                    GRP01340
                C-----------------------------------------------------------------CGRP01350
                C      INITIALIZE THE MINIMUM HISTORICAL VALUE TO BE THE FIRST ELEMENT CGRP01360
                C             OF HTEST THAT IS AN ACTIVE, CLASS2 STRATA.          CGRP01370
                C-----------------------------------------------------------------CGRP01380
ISN 0037              HMIN  = 0.0                                                   GRP01390
ISN 0038              IMIN  = 0                                                     GRP01400
ISN 0039              DO 40 I = 1,NAS                                               GRP01410
ISN 0040                IF (ACTIVE(I).NE.1 .OR. CLASS1(I).NE.0) GO TO 40            GRP01420
ISN 0042                HMIN = HTEST(I)                                             GRP01430
ISN 0043                IMIN = I                                                    GRP01440
ISN 0044                GO TO 41                                                    GRP01450
ISN 0045             40 CONTINUE                                                    GRP01460
ISN 0046             41 CONTINUE                                                    GRP01470
                C-----------------------------------------------------------------CGRP01480
                C WE NOW KEY ON THE ACREAGE STRATUM HAVING THE MINIMUM HISTORICAL  CGRP01490
                C ACREAGE VALUE AMONG THE ACTIVE CLASS2 ACREAGE STRATA.           CGRP01500
                C-----------------------------------------------------------------CGRP01510
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ISN 0067            DO 50 I = 1,NAS                                          GRP01520
ISN 0048              IF    (ACTIVE(I).NE.1 .OR. CLASS1(I).NE.0) GO TO 50    GRP01530
ISN 0050              IF    (HTEST(I).GE.HMIN)                   GO TO 50    GRP01540
ISN 0052                 HMIN = HTEST(I)                                     GRP01550
ISN 0053                 IMIN = I                                            GRP01560
ISN 0054          50 CONTINUE                                                GRP01570
ISN 0055             IF (IMIN.NE.0) GO TO 60                                 GRP01580
                  C*************************************************************CGRP01590
                  C************** FINISHED WITH CLASS 2 STRATA *****************CGRP01600
                  C*************************************************************CGRP01610
                  C                                                           CGRP01620
                  C     IF IN FACT IMIN IS ZERO AFTER WE PAST THROUGH ALL ACTIVE CLASS2  CGRP01630
                  C  STRATA (ACTIVE(I)=1), THEN WE ARE FINISHED WITH THE OPTIMAL       CGRP01640
                  C  GROUPING OF THE CLASS2 ACREAGE STRATA.                            CGRP01650
                  C                                                           CGRP01660
                  C     HOWEVER BEFORE CONTINUING WITH GROUPING THE REMAINING CLASS1   CGRP01670
                  C  STRATA, WE NEED TO CHECK IF ALL CLASS2 STRATA HAVE BEEN COMBINED  CGRP01680
                  C  WITH AT LEAST ONE CLASS1 STRATUM. THAT IS, ARE THERE ANY REMAINING CGRP01690
                  C  CLASS2 STRATA THAT ARE ISOLATED ?                                 CGRP01700
                  C                                                           CGRP01710
                  C     THIS CHECK WILL BE PERFORMED USING THE ARRAY OF ACTIVE. FOR A   CGRP01720
                  C  CLASS2 ACREAGE STRATUM, THE VALUE OF ACTIVE SHOULD NOW BE 9 WHICH CGRP01730
                  C  INDICATES THAT IT HAS BEEN COMBINED WITH A CLASS1 STRATUM.        CGRP01740
                  C                                                           CGRP01750
                  C     HOWEVER, IF THE VALUE OF ACTIVE IS NOT 9 THEN EITHER:          CGRP01760
                  C        ACTIVE(I) = 1  MEANING THIS CLASS2 WAS INITIALLY ACTIVATED  CGRP01770
                  C                       BUT NEVER CONSIDERED.                        CGRP01780
                  C                                                           CGRP01790
                  C           ACTIVE(I) = 8  MEANING THIS CLASS2 STRATUM WAS CONSIDERED CGRP01800
                  C                          BUT WAS DEACTIVATED.             CGRP01810
                  C-------------------------------------------------------------CGRP01820
ISN 0057             DO 55 I = 1,NAS                                          GRP01830
ISN 0058               IF (CLASS1(I).NE.0)                        GO TO 55    GRP01840
ISN 0060               IF (CLASS1(I).EQ.0 .AND. ACTIVE(I).EQ.9) GO TO 55    GRP01850
ISN 0062               GO TO 56                                               GRP01860
ISN 0063          55 CONTINUE                                                GRP01870
ISN 0064             IF (ISOLAT.NE.0) STOP 20056                             GRP01880
ISN 0066             GO TO 150                                               GRP01890
                  C                                                           GRP01900
                  C    PRINT OUT ACREAGE STRATA NOT COMBINED AND STOP.        GRP01910
                  C                                                           GRP01920
ISN 0067          56 WRITE(6,9056)                                           GRP01930
ISN 0068             WRITE(6,9057)                                           GRP01940
ISN 0069             WRITE(6,9058)                                           GRP01950
ISN 0070             DO 57 I = 1,NAS                                         GRP01960
ISN 0071               IF (CLASS1(I).NE.0) GO TO 57                          GRP01970
ISN 0073               IF (ACTIVE(I).EQ.9) GO TO 57                          GRP01980
ISN 0075                 WRITE(6,9059) IDSR(I)  ,ACTIVE(I)                   GRP01990
ISN 0076          57 CONTINUE                                                GRP02000
ISN 0077             STOP 20057                                              GRP02010
                  C                                                           GRP02020
                  C*************** CLASS 2 SEARCH CONTINUES ********************CGRP02030
                  C                                                           GRP02040
ISN 0078          60 CONTINUE                                                GRP02050
                  C-------------------------------------------------------------CGRP02060
                  C        TEST TO SEE IF THIS MINIMUM ACREAGE STRATA (IMIN) CAN BE    CGRP02070
                  C        COMBINED WITH AT LEAST ONE CLASS 1 STRATA.                  CGRP02080
                  C-------------------------------------------------------------CGRP02090
ISN 0079             DO 70 J = 1,NAS                                         GRP02100
ISN 0080               IF (JOIN(IMIN,J).EQ.0) GO TO 70                       GRP02110
ISN 0082               IF (CLASS1(J)    .EQ.1) GO TO 80                      GRP02120
ISN 0084          70 CONTINUE                                                GRP02130
                  C-------------------------------------------------------------CGRP02140
                  C     IF WE PROCEED THROUGH THE ABOVE LOOP AND FIND NO CLASS 1 STRATA  CGRP02150
                  C  THAT CAN BE COMBINED, THEN WE SET THE ACTIVE(I) VALUE TO 8. THIS  CGRP02160
                  C  MEANS THAT THIS CLASS 2 STRATA IS STILL ACTIVE BUT IS NOT ELIGIBLE CGRP02170
                  C  NOW TO BE COMBINED WITH ANY CLASS 1 ACREAGE STRATA. THIS AVOIDS    CGRP02180
                  C  REPETITIVE CHECKING OF THE SAME CLASS 2 STRATA.                   CGRP02190
                  C                                                           CGRP02200
                  C     WE THEN RETURN TO THE REMAINING CLASS 2 (IF ANY) AND FIND      CGRP02210
                  C  THE NEXT LARGEST MINIMUM HISTORICAL VALUE.                        CGRP02220
                  C-------------------------------------------------------------CGRP02230
ISN 0085             ACTIVE(IMIN) = 8                                        GRP02240
ISN 0086             GO TO 35                                                GRP02250
                  C-------------------------------------------------------------CGRP02260
                  C        IMIN NOW POINTS TO THE ACTIVE CLASS 2 STRATA HAVING THE     CGRP02270
                  C        MINIMUM CROP VALUE WHICH IS GIVEN IN HISMIN.                CGRP02280
                  C                                                           CGRP02290
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                C       WE NOW DESIGNATE THIS STRATA (IMIN) AS THE ITH GROUP.          CGRP02300
                C-------------------------------------------------------------------CGRP02310
   ISN 0087        80 CONTINUE                                                        GRP02320
   ISN 0088           IGRP = GROUP(IMIN)                                              GRP02330
                C-------------------------------------------------------------------CGRP02340
                C       NOW FIND THE CLASS 1 THAT THIS (CLASS 2) GROUP SHOULD BE    CGRP02350
                C       COMBINED WITH.                                              CGRP02360
                C                                                                   CGRP02370
                C       NOTE THAT SETTING RATIO MAX (RATMAX) TO 0.0 WILL FORCE      CGRP02380
                C       AT LEAST ONE OF THE FOLLOWING CLASS 1 ACREAGE GROUPS TO BE  CGRP02390
                C       JOINED WITH THIS CLASS 2 GROUP.                             CGRP02400
                C-------------------------------------------------------------------CGRP02410
   ISN 0089           RATMAX = 0.0                                                    GRP02420
   ISN 0090           JOINIM = 0                                                      GRP02430
   ISN 0091           JGRP   = 0                                                      GRP02440
   ISN 0092           DO 90 J = 1,NAS                                                 GRP02450
   ISN 0093             IF (JOIN(IMIN,J).EQ.0) GO TO 90                               GRP02460
   ISN 0095             IF (CLASS1(J)   .EQ.0) GO TO 90                               GRP02470
   ISN 0097             JGRP  = GROUP(J)                                              GRP02480
   ISN 0098             VOPTJ = GAMSPE(J)                                             GRP02490
                C                                                                     GRP02500
   ISN 0099             CALL FIND2(IGRP ,JGRP ,GROUP  ,NAS ,NSET ,ISET)               GRP02510
   ISN 0100             CALL AVOPT(NSET ,ISET ,VOPTIJ ,HMAT)                          GRP02520
   ISN 0101             IF (VOPTIJ.LE.0.0) GO TO 90                                   GRP02530
                C                                                                     GRP02540
   ISN 0103             RATIO =  VOPTJ / VOPTIJ                                       GRP02550
                C                                                                     GRP02560
   ISN 0104             IF (IOUT.EQ.6) WRITE(6,9220) NSET                             GRP02570
   ISN 0106             IF (IOUT.EQ.6) WRITE(6,9221) (ISET(I), I=1,NAS)               GRP02580
   ISN 0108             IF (IOUT.EQ.6) WRITE(6,9222) (HMAT(I), I=1,NAS)               GRP02590
   ISN 0110             IF (IOUT.EQ.6) WRITE(6,9090) RATIO,VOPTJ,VOPTIJ               GRP02600
   ISN 0112             IF (IOUT.EQ.6) WRITE(6,9091) (LINE,ILINE=1,22)                GRP02610
                C                                                                     GRP02620
   ISN 0114             IF (RATIO.LE.RATMAX) GO TO 90                                 GRP02630
                C                                                                     GRP02640
   ISN 0116               RATMAX = RATIO                                              GRP02650
   ISN 0117               JOINIM =     J                                              GRP02660
                C                                                                     GRP02670
   ISN 0118             NHX = NSET                                                    GRP02680
   ISN 0119             IF (NHX.LE.0) STOP 20089                                      GRP02690
   ISN 0121             DO 89 ITEMP = 1,NHX                                           GRP02700
   ISN 0122               INDHX(ITEMP)    = ISET(ITEMP)                               GRP02710
   ISN 0123               HXTEMP(ITEMP) = HMAT(ITEMP)                                 GRP02720
   ISN 0124        89   CONTINUE                                                      GRP02730
   ISN 0125             VTEMP = VOPTIJ                                                GRP02740
                C                                                                     GRP02750
   ISN 0126        90 CONTINUE                                                        GRP02760
   ISN 0127           IF (JOINIM.EQ.0) STOP 20090                                    GRP02770
                C-------------------------------------------------------------------CGRP02780
                C    WE NOW HAVE THE TWO GROUPS TO BE COMBINED WITH GROUP POINTERS  CGRP02790
                C OF IMIN AND JOINIM.                                               CGRP02800
                C    THE COLLECTION OF THE COMBINED STRATA IS INDICATED IN THE VECTOR CGRP02810
                C ISET. THE COMBINED ACREAGE VARIANCE IS GIVEN IN THE VARIABLE       CGRP02820
                C VOPTIJ WHICH IS RETURNED FROM AVOPT.                              CGRP02830
                C                                                                   CGRP02840
                C    WE NOW REFLECT THE COMBINING OF THESE TWO GROUPS IN THE VECTORS CGRP02850
                C GROUP ,ACTIVE ,HTEST ,GAMSPE ,AND IN THE MATRICES OF JOIN AND HMATRX.CGRP02860
                C                                                                   CGRP02870
                C    NOTE : WE KEEP THE GROUP INDEX CORRESPONDING TO THE CLASS 1    CGRP02880
                C           (JOINIM) AND DELETE THE GROUP INDEX CORRESPONDING TO THE CGRP02890
                C           CLASS 2 (IMIN).                                         CGRP02900
                C-------------------------------------------------------------------CGRP02910
   ISN 0129           INEW = JOINIM                                                  GRP02920
   ISN 0130           IDEL = IMIN                                                    GRP02930
   ISN 0131           IF (CLASS1(JOINIM).NE.1) STOP 20100                            GRP02940
   ISN 0133           GROUP(IDEL)    = GROUP(INEW)                                   GRP02950
                C                                                                     GRP02960
   ISN 0134           ACTIVE(IDEL)   = 9                                             GRP02970
   ISN 0135           ISOLAT = ISOLAT - 1                                            GRP02980
                C                                                                     GRP02990
   ISN 0136           HTEST(INEW) = HTEST(INEW) + HTEST(IDEL)                        GRP03000
   ISN 0137           HTEST(IDEL) = 0.0                                              GRP03010
                C                                                                     GRP03020
   ISN 0138           DO 100 I = 1,NAS                                               GRP03030
   ISN 0139             JOIN(INEW,I) = JOIN(INEW,I) + JOIN(IDEL,I)                   GRP03040
                *                      -JOIN(INEW,I)*JOIN(IDEL,I)                   GRP03050
   ISN 0140             JOIN(IDEL,I) = 0                                             GRP03060
   ISN 0141             JOIN(I,INEW) = JOIN(INEW,I)                                  GRP03070
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ISN 0142                JOIN(I,IDEL) = 0                                        GRP03080
ISN 0143          100 CONTINUE                                                  GRP03090
ISN 0144              JOIN(INEW,IDEL) = 0                                       GRP03100
ISN 0145              JOIN(IDEL,INEW) = 0                                       GRP03110
ISN 0146              JOIN(INEW,INEW) = 0                                       GRP03120
                  C                                                           GRP03130
                  C  CHECKING THE JOIN MATRIX FOR SYMMETRY.                   GRP03140
                  C                                                           GRP03150
ISN 0147              DO 102 I = 1,NAS                                        GRP03160
ISN 0148                DO 102 J = 1,NAS                                      GRP03170
ISN 0149                  IF (JOIN(I,J).EQ.JOIN(J,I)) GO TO 102               GRP03180
ISN 0151                  DO 101 I1 = 1,NAS                                   GRP03190
ISN 0152                   WRITE(6,9252) (JOIN(I1,J1), J1=1,NAS)              GRP03200
ISN 0153          101     CONTINUE                                            GRP03210
ISN 0154                  STOP 20101                                          GRP03220
ISN 0155          102 CONTINUE                                                GRP03230
                  C                                                           GRP03240
ISN 0156              GAMSPE(INEW) = VTEMP                                    GRP03250
ISN 0157              GAMSPE(IDEL) = 0.0                                      GRP03260
                  C                                                           GRP03270
ISN 0158              DO 110 I = 1,NHX                                        GRP03280
ISN 0159                IAS          = INDHX(I)                             GRP03290
ISN 0160                HMATRX(IAS) = HXTEMP(I)                             GRP03300
ISN 0161          110 CONTINUE                                                GRP03310
ISN 0162              IF (IOUT.EQ.5 .OR. IOUT.EQ.6) WRITE(6,9260) INEW,IDEL   GRP03320
ISN 0164              IF (IOUT.EQ.5 .OR. IOUT.EQ.6) WRITE(6,9266) (GROUP(I),I=1,NAS)  GRP03330
ISN 0166              IF (IOUT.EQ.5 .OR. IOUT.EQ.6) WRITE(6,9261)             GRP03340
ISN 0168              IF (IOUT.EQ.5 .OR. IOUT.EQ.6) WRITE(6,9262) (HMATRX(I),I=1,NAS)  GRP03350
ISN 0170              IF (IOUT.EQ.5 .OR. IOUT.EQ.6) WRITE(6,9263) (HTEST(I),I=1,NAS)  GRP03360
ISN 0172              IF (IOUT.EQ.5 .OR. IOUT.EQ.6) WRITE(6,9264) (GAMSPE(I),I=1,NAS)  GRP03370
ISN 0174              IF (IOUT.EQ.5 .OR. IOUT.EQ.6) WRITE(6,9265) (SLINE, ILINE=1,33)  GRP03380
                  C-----------------------------------------------------------CGRP03390
                  C    WE NOW REACTIVATE (ACTIVE(I)=1) ANY CLASS 2 STRATA THAT WERE  CGRP03400
                  C  DEACTIVATED (ACTIVE(I)=8) IN THE EARLIER SECTION OF THE GROUPING  CGRP03410
                  C  PROCEDURE BUT HAVE NOT BEEN COMBINED TO A CLASS 1 STRATUM.  CGRP03420
                  C-----------------------------------------------------------CGRP03430
ISN 0176              DO 120 I = 1,NAS                                        GRP03440
ISN 0177                IF (CLASS1(I).EQ.0 .AND. ACTIVE(I).EQ.8)  ACTIVE(I) = 1  GRP03450
ISN 0179          120 CONTINUE                                                GRP03460
                  C                                                           GRP03470
                  C    RETURN TO TOP OF CLASS 2 SEARCH.                       GRP03480
                  C                                                           GRP03490
ISN 0180              GO TO 35                                                GRP03500
                  C***********************************************************CGRP03510
                  C*************** BOTTOM OF CLASS 2 SEARCH  *****************CGRP03520
                  C***********************************************************CGRP03530
ISN 0181          150 CONTINUE                                                GRP03540
                  C***********************************************************CGRP03550
                  C*************** START  OF CLASS 1 SEARCH  *****************CGRP03560
                  C***********************************************************CGRP03570
                  C                                                           CGRP03580
                  C   PROCESSING THE REMAINDER OF ACREAGE STRATA :            CGRP03590
                  C                C L A S S 1  AND/OR  C L A S S 2 GROUPS.   CGRP03600
                  C                                                           CGRP03610
                  C   NOTE: CLASS 2 GROUP IS A CLASS 2 ACREAGE STRATA THAT HAS BEEN  CGRP03620
                  C         COMBINED WITH A CLASS 1 STRATA IN THE FIRST PART OF THIS  CGRP03630
                  C         SUBROUTINE.                                       CGRP03640
                  C                                                           CGRP03650
                  C   FIRST CHECK TO MAKE SURE ALL CLASS 1 STRATA ARE ACTIVE AND ALL  CGRP03660
                  C   CLASS 2 STRATA ARE NOT ACTIVE.                          CGRP03670
                  C-----------------------------------------------------------CGRP03680
ISN 0182              DO 160 I = 1,NAS                                        GRP03690
ISN 0183                IF (CLASS1(I).EQ.1 .AND. ACTIVE(I).EQ.1) GO TO 160    GRP03700
ISN 0185                IF (ACTIVE(I).NE.1 .AND. CLASS1(I).NE.1) GO TO 160    GRP03710
ISN 0187                WRITE(6,9160)                                         GRP03720
ISN 0188                STOP 20160                                            GRP03730
ISN 0189          160 CONTINUE                                                GRP03740
                  C-----------------------------------------------------------CGRP03750
                  C    INITIALIZE THE MINIMUM HISTORICAL VALUE TO THE FIRST ELEMENT  CGRP03760
                  C    IN THE VECTOR HTEST AMONG THE ACTIVE STRATA.           CGRP03770
                  C-----------------------------------------------------------CGRP03780
ISN 0190          170 CONTINUE                                                GRP03790
ISN 0191              HMIN = 0.0                                              GRP03800
ISN 0192              IMIN = 0                                                GRP03810
ISN 0193              DO 180 I = 1,NAS                                        GRP03820
ISN 0194                IF (ACTIVE(I).NE.1) GO TO 180                         GRP03830
ISN 0196                HMIN = HTEST(I)                                       GRP03840
ISN 0197                IMIN =          I                                     GRP03850
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ISN 0198              GO TO 181                                                  GRP03860
ISN 0199        180 CONTINUE                                                     GRP03870
ISN 0200        181 CONTINUE                                                     GRP03880
                C-----------------------------------------------------------------CGRP03890
                C    IF IMIN=0 THEN ALL STRATA HAVE BEEN EITHER COMBINED         CGRP03900
                C              OR DEACTIVATED. THAT IS THERE ARE NO MORE         CGRP03910
                C              ACTIVE STRATA. WE ARE THUS FINISHED.              CGRP03920
                C-----------------------------------------------------------------CGRP03930
ISN 0201              IF (IMIN.EQ.0) GO TO 300                                   GRP03940
                C-----------------------------------------------------------------CGRP03950
                C     FIND THE MINIMUM HISTORICAL VALUE OF HTEST(I) AMONG THE     CGRP03960
                C     ACTIVE ACREAGE STRATA.                                      CGRP03970
                C     NOTE :IMIN  WILL POINT TO THIS ACREAGE STRATUM.             CGRP03980
                C             HMIN  WILL HAVE THIS MINIMUM VALUE.                 CGRP03990
                C-----------------------------------------------------------------CGRP04000
ISN 0203              DO 190 I = 1,NAS                                           GRP04010
ISN 0204                IF (ACTIVE(I).NE.1)    GO TO 190                       GRP04020
ISN 0206                IF (HTEST(I) .GE.HMIN)GO TO 190                        GRP04030
ISN 0208                  IMIN =  I                                            GRP04040
ISN 0209                  HMIN = HTEST(I)                                      GRP04050
ISN 0210        190 CONTINUE                                                     GRP04060
                C-----------------------------------------------------------------CGRP04070
                C     CHECK TO SEE IF THERE IS AT LEAST ONE ACREAGE STRATA        CGRP04080
                C  GROUP ELIGIBLE TO BE COMBINED WITH THE IMIN ACREAGE STRATA     CGRP04090
                C  GROUP.                                                         CGRP04100
                C-----------------------------------------------------------------CGRP04110
ISN 0211              JFIRST = 0                                                 GRP04120
ISN 0212              DO 200 J = 1,NAS                                           GRP04130
ISN 0213                IF (JOIN(IMIN,J).EQ.0) GO TO 200                         GRP04140
ISN 0215                  JFIRST = J                                             GRP04150
ISN 0216                  GO TO 201                                              GRP04160
ISN 0217        200 CONTINUE                                                     GRP04170
ISN 0218        201 CONTINUE                                                     GRP04180
                C-----------------------------------------------------------------CGRP04190
                C     CHECK TO SEE IF JFIRST IS STILL ZERO, WHICH INDICATES THAT  CGRP04200
                C  THERE ARE NO ACREAGE STRATA GROUPS TO BE COMBINED. IF THIS IS  CGRP04210
                C  THE CASE, WE DEACTIVATE THIS (IMIN) STRATA AND GO BACK TO     CGRP04220
                C  HTEST TO FIND THE NEXT LARGEST MINIMUM HISTORICAL ACREAGE     CGRP04230
                C  VALUE AMONG THE REMAINING ACTIVE STRATA.                      CGRP04240
                C-----------------------------------------------------------------CGRP04250
ISN 0219              IF (JFIRST.NE.0) GO TO 210                                 GRP04260
ISN 0221              ACTIVE(IMIN) = 2                                           GRP04270
ISN 0222              GO TO 170                                                  GRP04280
                C-----------------------------------------------------------------CGRP04290
                C     WE NOW DESIGNATE THIS MINIMUM HISTORICAL ACREAGE            CGRP04300
                C  STRATA (IMIN) TO BE THE ITH GROUP (IGRP).                     CGRP04310
                C-----------------------------------------------------------------CGRP04320
ISN 0223        210 CONTINUE                                                     GRP04330
ISN 0224              IGRP = GROUP(IMIN)                                         GRP04340
ISN 0225              IF (IOUT.EQ.5)  WRITE(6,9210) IGRP                         GRP04350
                C-----------------------------------------------------------------CGRP04360
                C     INITIALIZE VALUES FOR THE FOLLOWING LOOP WHICH FINDS        CGRP04370
                C  THE JOINING ACREAGE STRATA GROUP.                             CGRP04380
                C-----------------------------------------------------------------CGRP04390
ISN 0227              VOPTI  = GAMSPE(IMIN)                                      GRP04400
ISN 0228              RATMAX = 0.0                                               GRP04410
ISN 0229              JOINM =  0                                                 GRP04420
ISN 0230              VOPTJ  = 0.0                                               GRP04430
ISN 0231              DO 220 J = JFIRST,NAS                                      GRP04440
ISN 0232                IF (JOIN(IMIN,J).EQ.0) GO TO 220                         GRP04450
ISN 0234                JGRP  = GROUP(J)                                         GRP04460
ISN 0235                VOPTJ = GAMSPE(J)                                        GRP04470
                C                                                                GRP04480
ISN 0236                CALL FIND2(IGRP, JGRP, GROUP ,NAS ,NSET ,ISET)           GRP04490
ISN 0237                CALL AVOPT(NSET, ISET, VOPTIJ ,HMAT )                    GRP04500
ISN 0238                IF (VOPTIJ.LE.0.0) GO TO 220                             GRP04510
                C                                                                GRP04520
ISN 0240                RATIO = ( VOPTI + VOPTJ )  /  VOPTIJ                     GRP04530
                C                                                                GRP04540
ISN 0241                IF (IOUT.EQ.6)  WRITE(6,9220)  NSET                      GRP04550
ISN 0243                IF (IOUT.EQ.6)  WRITE(6,9221) (ISET(I) , I =1,NAS)       GRP04560
ISN 0245                IF (IOUT.EQ.6)  WRITE(6,9222) ( HMAT(I), I =1,NSET)      GRP04570
ISN 0247                IF (IOUT.EQ.6)  WRITE(6,9223) VOPTIJ,VOPTI,VOPTJ         GRP04580
ISN 0249                IF (IOUT.EQ.6)  WRITE(6,9224) RATIO                      GRP04590
ISN 0251                IF (IOUT.EQ.6)  WRITE(6,9225)(LINE ,ILINE =1,22)         GRP04600
                C                                                                GRP04610
ISN 0253                IF (RATIO.LE.RATMAX) GO TO 220                           GRP04620
                C                                                                GRP04630
```

```
ISN 0255            RATMAX = RATIO                                          GRP04640
ISN 0256            JOINIM =     J                                          GRP04650
                    C                                                       GRP04660
ISN 0257            NHX = NSET                                              GRP04670
ISN 0258            IF (NHX.LE.0) STOP 20219                                GRP04680
ISN 0260            DO 219 ITEMP = 1,NHX                                    GRP04690
ISN 0261              INOHX(ITEMP)  = ISET(ITEMP)                           GRP04700
ISN 0262              HXTEMP(ITEMP) = HMAT(ITEMP)                           GRP04710
ISN 0263      219   CONTINUE                                                GRP04720
ISN 0264            VTEMP = VOPTIJ                                          GRP04730
                    C                                                       GRP04740
ISN 0265      220 CONTINUE                                                  GRP04750
              C-----------------------------------------------------------CGRP04760
              C     IF JOINIM REMAINS ZERO THEN THE JOINING RATIO(RATIO)    CGRP04770
              C  WAS NOT CALCULATED, WHICH IS AN ERROR.                     CGRP04780
              C-----------------------------------------------------------CGRP04790
ISN 0266            IF (JOINIM.EQ.0) STOP 20220                             GRP04800
              C-----------------------------------------------------------CGRP04810
              C     IF THE RATIO FOUND IS IN FACT LESS THAN OR EQUAL TO 1.0,CGRP04820
              C  THEN WE DO NOT WANT TO EXECUTE THIS PARTICULAR COMBINATION.CGRP04830
              C  SINCE THE VARIANCE WILL INCREASE.                         CGRP04840
              C     NOTE  : IF RATIO <= 1.0 THEN  V(I,J) > (V(I)+V(J)) ,  CGRP04850
              C             WHICH MEANS THE COMBINED VARIANCE IS MORE THAN CGRP04860
              C             THE SUM OF THE TWO INDIVIDUAL VARIANCES, WHICH CGRP04870
              C             WE DO NOT WANT.                               CGRP04880
              C                                                           CGRP04890
              C     IN THIS CASE WE WILL DEACTIVATE THE IMIN ACREAGE STRATA CGRP04900
              C  AND RETURN TO FIND THE NEXT LARGEST MINIMUM HISTORICAL     CGRP04910
              C  ACREAGE GROUP.                                           CGRP04920
              C-----------------------------------------------------------CGRP04930
ISN 0268            IF (RATMAX.GT.1.0) GO TO 230                            GRP04940
ISN 0270            ACTIVE(IMIN) = 2                                        GRP04950
ISN 0271            IF (IOUT.EQ.5)  WRITE(6,9230) (LINE, ILINE =1,22)       GRP04960
ISN 0273            GO TO 170                                               GRP04970
              C-----------------------------------------------------------CGRP04980
              C     WE NOW ACCOMPLISH THE COMBINING OF THE IMIN AND JOIMIN   CGRP04990
              C  TWO ACREAGE STRATA GROUPS BY REFLECTING CHANGES IN THE     CGRP05000
              C  VECTORS  GROUP,  ACTIVE,  HTEST,  GAMSPE, AND IN THE      CGRP05010
              C  MATRICES JOIN, AND HMATRX.                                 CGRP05020
              C-----------------------------------------------------------CGRP05030
ISN 0274      230 CONTINUE                                                  GRP05040
ISN 0275            INEW =   IMIN                                           GRP05050
ISN 0276            IDEL = JOINIM                                           GRP05060
                    C                                                       GRP05070
ISN 0277            DO 240 I = 1,NAS                                        GRP05080
ISN 0278              IF (GROUP(I).EQ.IDEL) GROUP(I) = INEW                 GRP05090
ISN 0280      240 CONTINUE                                                  GRP05100
                    C                                                       GRP05110
ISN 0281            ACTIVE(IDEL) = 3                                        GRP05120
                    C                                                       GRP05130
ISN 0282            HTEST(INEW) = HTEST(INEW) + HTEST(IDEL)                 GRP05140
ISN 0283            HTEST(IDEL) = 0.0                                       GRP05150
                    C                                                       GRP05160
ISN 0284            DO 250 I = 1,NAS                                        GRP05170
ISN 0285              JOIN(INEW,I) = JOIN(INEW,I) + JOIN(IDEL,I)            GRP05180
                    *                - JOIN(INEW,I) * JOIN(IDEL,I)        GRP05190
ISN 0286              JOIN(IDEL,I) =                0                     GRP05200
ISN 0287              JOIN(I,INEW) = -JOIN(INEW,I)                        GRP05210
ISN 0288              JOIN(I,IDEL) =                0                     GRP05220
ISN 0289      250 CONTINUE                                                  GRP05230
ISN 0290            JOIN(INEW,IDEL) = 0                                     GRP05240
ISN 0291            JOIN(IDEL,INEW) = 0                                     GRP05250
ISN 0292            JOIN(INEW,INEW) = 0                                     GRP05260
                    C                                                       GRP05270
                    C   CHECKING THE JOIN MATRIX FOR SYMMETRY.              GRP05280
                    C                                                       GRP05290
ISN 0293            DO 251 I = 1,NAS                                        GRP05300
ISN 0294              DO 251 J = 1,NAS                                      GRP05310
ISN 0295                IF (JOIN(I,J).EQ.JOIN(J,I))  GO TO 251              GRP05320
ISN 0297                DO 252 II = 1,NAS                                   GRP05330
ISN 0298      252       WRITE(6,9252) ( JOIN(I1,J1),JI=1,NAS)               GRP05340
ISN 0299                STOP 20251                                          GRP05350
ISN 0300      251 CONTINUE                                                  GRP05360
                    C                                                       GRP05370
ISN 0301            GAMSPE(INEW) = VTEMP                                    GRP05380
ISN 0302            GAMSPE(IDEL) =   0.0                                    GRP05390
                    C                                                       GRP05400
ISN 0303            DO 260 I = 1,NHX                                        GRP05410
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ISN 0304            IAS          = INDHX(I)                                          GRP05420
ISN 0305            HMATRX(IAS) = HXTEMP(I)                                          GRP05430
ISN 0306      260 CONTINUE                                                           GRP05440
ISN 0307            IF ((IOUT.EQ.5 .OR. IOUT.EQ.6)  WRITE(6,9260) INEW,IDEL          GRP05450
ISN 0309            IF ((IOUT.EQ.5 .OR. IOUT.EQ.6)  WRITE(6,9266) (GROUP(I),I=1,NAS) GRP05460
ISN 0311            IF ((IOUT.EQ.5 .OR. IOUT.EQ.6)  WRITE(6,9261)                    GRP05470
ISN 0313            IF ((IOUT.EQ.5 .OR. IOUT.EQ.6)  WRITE(6,9262) (HMATRX(I),I=1,NAS) GRP05480
ISN 0315            IF ((IOUT.EQ.5 .OR. IOUT.EQ.6)  WRITE(6,9263) (HTEST(I), I=1,NAS) GRP05490
ISN 0317            IF ((IOUT.EQ.5 .OR. IOUT.EQ.6)  WRITE(6,9264) (GAMSPE(I),I=1,NAS) GRP05500
ISN 0319            IF ((IOUT.EQ.5 .OR. IOUT.EQ.6)  WRITE(6,9265) (SLINE, I=1,33)    GRP05510
                C-------------------------------------------------------------------CGRP05520
                C     REACTIVATE ANY  CLASS 1 STRATA THAT WERE DEACTIVATED.         CGRP05530
                C-------------------------------------------------------------------CGRP05540
ISN 0321            DO 270 I = 1,NAS                                                 GRP05550
ISN 0322              IF (CLASS1(I).EQ.1 .AND. ACTIVE(I).EQ.2)   ACTIVE(I) = 1       GRP05560
ISN 0324      270 CONTINUE                                                           GRP05570
                C*******************************************************************CGRP05580
                C**************** BOTTOM OF CLASS 1 SEARCH *************************CGRP05590
                C*******************************************************************CGRP05600
ISN 0325            GO TO 170                                                        GRP05610
                C-------------------------------------------------------------------CGRP05620
                C                                                                   CGRP05630
                C      FINISHED : CHECK TO SEE IF THE VECTOR ACTIVE IS IN THE       CGRP05640
                C                 CORRECT FORM. THIS WILL INDICATE WHETHER THE      CGRP05650
                C                 GROUPING IS IN FACT COMPLETED.                    CGRP05660
                C                                                                   CGRP05670
                C      THE CORRECT FORM OF ACTIVE SHOULD BE:                        CGRP05680
                C      ACTIVE(I) = 9  FOR ALL CLASS 2 ACREAGE STRATA.               CGRP05690
                C                                                                   CGRP05700
                C      ACTIVE(I) = 2  A GROUP INDICATOR AMONG THE TOTAL NAS ACREAGE CGRP05710
                C                      STRATA.                                      CGRP05720
                C                                                                   CGRP05730
                C      ACTIVE(I) = 3  AN ABSORBED (CLASS1) STRATA BY ONE OF THE     CGRP05740
                C                     "2" GROUPS.                                   CGRP05750
                C-------------------------------------------------------------------CGRP05760
ISN 0326      300 CONTINUE                                                           GRP05770
ISN 0327            SFLAG = 0.0                                                      GRP05780
ISN 0328            DO 310 I = 1,NAS                                                 GRP05790
ISN 0329              IF    (CLASS1(I).EQ.0 .AND. ACTIVE(I).EQ.9)  GO TO 310         GRP05800
ISN 0331              IF    (CLASS1(I).EQ.1 .AND. ACTIVE(I).EQ.2)  GO TO 310         GRP05810
ISN 0333              IF    (CLASS1(I).EQ.1 .AND. ACTIVE(I).EQ.3)  GO TO 310         GRP05820
ISN 0335              SFLAG = 1                                                      GRP05830
ISN 0336      310 CONTINUE                                                           GRP05840
ISN 0337            IF (SFLAG.NE.0) GO TO 329                                        GRP05850
                C-------------------------------------------------------------------CGRP05860
                C     CHANGE THE NUMBERS OF THE GROUPING VECTOR (GROUP) INTO        CGRP05870
                C  SEQUENIAL NUMBERS AND COUNT THE TOTAL NUMBER OF GROUPS FOUND.    CGRP05880
                C-------------------------------------------------------------------CGRP05890
ISN 0339            NGRPS = 0                                                        GRP05900
ISN 0340            DO 320 I = 1,NAS                                                 GRP05910
ISN 0341              IF (ACTIVE(I).NE.2) GO TO 320                                  GRP05920
ISN 0343              NGRPS    =  NGRPS + 1                                          GRP05930
ISN 0344              INDEX    = GROUP(I)                                            GRP05940
ISN 0345               DO 319 J = 1,NAS                                              GRP05950
ISN 0346                 IF (GROUP(J).EQ.INDEX) GROUP(J) = NGRPS                     GRP05960
ISN 0348      319      CONTINUE                                                      GRP05970
ISN 0349      320 CONTINUE                                                          GRP05980
                C                                                                   GRP05990
ISN 0350            IF (IOUT.EQ.5 .OR. IOUT.EQ.6) WRITE(6,9310)                     GRP06000
ISN 0352            IF (IOUT.EQ.5 .OR. IOUT.EQ.6) WRITE(6,9311)                     GRP06010
                   #                    ((I,CLASS1(I),GROUP(I),ACTIVE(I)), I=1,NAS) GRP06020
                C                                                                   GRP06030
ISN 0354            RETURN                                                          GRP06040
                C                                                                   GRP06050
ISN 0355      329 DO 330 I = 1,NAS                                                  GRP06060
ISN 0356              IF (CLASS1(I).EQ.0 .AND. ACTIVE(I).NE.9) WRITE(6,9320) I,ISET(I) GRP06070
ISN 0358              IF (CLASS1(I).EQ.1 .AND. ACTIVE(I).NE.2                       GRP06080
                   #                       .AND. ACTIVE(I).NE.3) WRITE(6,9321) I,ISET(I) GRP06090
ISN 0360      330 CONTINUE                                                          GRP06100
ISN 0361            STOP 20330                                                      GRP06110
                C-------------------------------------------------------------------CGRP06120
                C          F O R M A T S                                            CGRP06130
                C-------------------------------------------------------------------CGRP06140
ISN 0362      9035 FORMAT(1H1)                                                      GRP06150
ISN 0363      9056 FORMAT(4X,'A CLASS2 ACREAGE STRATA WAS NOT COMBINED WITH A CLASS1' GRP06160
                   #)                                                               GRP06170
ISN 0364      9057 FORMAT(4X,'ACREAGE STRATA IN THE OPMITAL GROUPING SEARCH. THE')   GRP06180
ISN 0365      9058 FORMAT(4X,'FOLLOWING STRATA NEED TO BE COMBINED :   ')            GRP06190
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ISN 0366      9059 FORMAT(10X,'ACREAGE STRATA',I5,3X,'ACTIVE(I)=',I3)                    GRP06200
ISN 0367      9090 FORMAT(1X,'RATIO =',F15.9,5X,'VOPTJ =',F18.5,'VOPTIJ =',F18.5)        GRP06210
ISN 0368      9091 FORMAT(1X,33A4)                                                      GRP06220
ISN 0369      9160 FORMAT(3X,'ERROR IN THE ACTIVE VECTOR COMPARING TO THE CLASS VECTOGRP06230
             &R.')                                                                     GRP06240
ISN 0370      9210 FORMAT(3X,'MINIMUM HISTORICAL ACREAGE GROUP (IMIN) IS  ',I5)         GRP06250
ISN 0371      9220 FORMAT(2X,'NSET = ',I5)                                              GRP06260
ISN 0372      9221 FORMAT(2X,'ISET = ',20I4)                                            GRP06270
ISN 0373      9222 FORMAT(2X,'H MATRIX IS ',9E12.5)                                     GRP06280
ISN 0374      9223 FORMAT(1X,' VOPTIJ = ',F18.5,2X,'VOPTI=',F18.5,2X,'VOPTJ=',F18.5)    GRP06290
ISN 0375      9224 FORMAT(1X,' RATIO = ',F12.9)                                         GRP06300
ISN 0376      9225 FORMAT(1X,33A4)                                                      GRP06310
ISN 0377      9230 FORMAT(1X,33A4)                                                      GRP06320
ISN 0378      9252 FORMAT(2X,40I2)                                                      GRP06330
ISN 0379      9260 FORMAT(2X,'  NEW GROUP IS ',I3,2X,'DELETED GROUP IS =',I3)          GRP06340
ISN 0380      9266 FORMAT(3X,'GROUPING = ',15I4)                                        GRP06350
ISN 0381      9261 FORMAT(2X,' NEW H MATRIX ')                                          GRP06360
ISN 0382      9262 FORMAT(2X,10F12.3)                                                   GRP06370
ISN 0383      9263 FORMAT(2X,' HISTORICAL TEST DATA = ',10(F9.3,1X))                    GRP06380
ISN 0384      9264 FORMAT(3X,'RETAINED VOPTIJ = ',7(F12.3,3X))                          GRP06390
ISN 0385      9265 FORMAT(1X,33A4)                                                      GRP06400
ISN 0386      9310 FORMAT(///,3X,' FINAL GROUPING OF THE ACREAGE STRATA IS :',/,       GRP06410
             &     /,3X,6X,' CLASS ',6X,'GROUP INDEX',5X,' ACTIVITY INDEX')           GRP06420
ISN 0387      9311 FORMAT(4X,I3,3X,I3,10X,I4,17X,I2)                                    GRP06430
ISN 0388      9320 FORMAT(2X,'ERROR : ACTIVE(',I2,') FOR CLASS 2 STRATA(',I2,          GRP06440
             &') IS INCORRECT. IT SHOULD BE A VALUE OF 9.')                            GRP06450
ISN 0389      9321 FORMAT(2X,'ERROR : ACTIVE(',I2,') FOR CLASS 1 STRATA(',I2,          GRP06460
             &') IS INCORRECT. IT SHOULD BE A VALUE OF 2 OR 3.')                       GRP06470
ISN 0390          END                                                                   GRP06480
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*****FORTRAN CROSS REFERENCE LISTING*****

SYMBOL	INTERNAL STATEMENT NUMBERS
I	0011 0012 0012 0014 0015 0016 0017 0017 0017 0020 0021 0021 0023 0024 0027 0028 0039 0040 0040
	0042 0043 0047 0048 0048 0050 0052 0053 0057 0058 0060 0060 0070 0071 0073 0075 0075 0106 0106
	0106 0108 0108 0108 0138 0139 0139 0139 0139 0139 0140 0141 0141 0142 0147 0149 0149 0158 0159
	0160 0164 0164 0164 0168 0168 0168 0170 0170 0170 0172 0172 0172 0176 0177 0177 0177 0182 0183
	0183 0185 0185 0193 0194 0196 0197 0203 0204 0206 0208 0209 0243 0243 0243 0245 0245 0245 0277
	0278 0278 0284 0285 0285 0285 0285 0285 0286 0287 0287 0288 0293 0295 0295 0303 0304 0305 0309
	0309 0309 0313 0313 0313 0315 0315 0315 0317 0317 0317 0319 0319 0321 0322 0322 0322 0328 0329
	0329 0331 0331 0333 0333 0340 0341 0344 0352 0352 0352 0352 0352 0355 0356 0356 0356 0356
	0358 0358 0358 0358 0358
J	0079 0080 0082 0092 0093 0095 0097 0098 0117 0148 0149 0149 0212 0213 0215 0231 0232 0234 0235
	0256 0294 0295 0295 0345 0346 0346
JJ	0151 0152 0297 0298
JJ	0152 0152 0152 0298 0298 0298
GAP	0003 0005
IAS	0159 0160 0304 0305
NAS	0005 0011 0014 0020 0023 0027 0039 0047 0057 0070 0079 0092 0099 0106 0108 0138 0147 0148 0151
	0152 0164 0168 0170 0172 0176 0182 0193 0203 0212 0231 0236 0243 0277 0284 0293 0294 0297 0298
	0309 0313 0315 0317 0321 0328 0340 0345 0352 0355
NHX	0118 0119 0121 0158 0257 0258 0260 0303
HMAT	0008 0100 0108 0123 0237 0245 0262
HMIN	0037 0042 0050 0052 0191 0196 0206 0209
IDEL	0130 0133 0134 0136 0137 0139 0139 0140 0142 0144 0145 0157 0162 0276 0278 0281 0282 0283 0285
	0285 0285 0288 0290 0291 0302 0307
IDSR	0006 0075
IGRP	0088 0099 0224 0225 0236
IMIN	0038 0043 0053 0055 0080 0085 0088 0093 0130 0192 0197 0201 0208 0213 0221 0224 0227 0232 0270
	0275
INEW	0129 0133 0136 0136 0139 0139 0139 0141 0141 0144 0145 0146 0146 0156 0162 0275 0278 0282 0282
	0285 0285 0285 0287 0287 0290 0291 0292 0292 0301 0307
IOUT	0005 0034 0034 0104 0106 0108 0110 0112 0162 0162 0164 0164 0166 0166 0168 0168 0170 0170 0172
	0172 0174 0174 0225 0241 0243 0245 0247 0249 0251 0271 0307 0307 0309 0309 0311 0311 0313 0313
	0315 0315 0317 0317 0319 0319 0350 0350 0352 0352
ISET	0008 0099 0100 0106 0122 0236 0237 0243 0261 0356 0358
JGRP	0091 0097 0099 0234 0236
JOIN	0004 0005 0080 0093 0139 0139 0139 0139 0139 0140 0141 0141 0142 0144 0145 0146 0149 0149 0152
	0213 0232 0285 0285 0285 0285 0285 0286 0287 0287 0288 0290 0291 0292 0295 0295 0298
LINE	0010 0112 0251 0271
NARB	0005
NSET	0099 0100 0104 0118 0236 0237 0241 0245 0257
AVOPT	0100 0237
DACES	0006
FIND2	0099 0236
GROUP	0002 0009 0012 0088 0097 0099 0133 0133 0164 0224 0234 0236 0278 0278 0309 0344 0346 0346 0352
HTEST	0008 0021 0042 0050 0052 0136 0136 0136 0137 0170 0196 0206 0209 0282 0282 0282 0283 0315
ICROP	0005

*****FORTRAN CROSS REFERENCE LISTING*****

SYMBOL	INTERNAL STATEMENT NUMBERS
ILINE	0112 0112 0174 0174 0251 0251 0271 0271
INDEX	0344 0346
INDHX	0008 0122 0159 0261 0304
ITEMP	0121 0122 0122 0123 0123 0260 0261 0261 0262 0262
NGRPS	0002 0339 0343 0343 0346
NUMII	0026 0028 0028 0031 0033
RATIO	0103 0110 0114 0116 0240 0249 0253 0255
SFLAG	0327 0335 0337
SLINE	0010 0174 0319
TAREA	0006
VARTY	0006
VOPTI	0227 0240 0247
VOPTJ	0098 0103 0110 0230 0235 0240 0247
VTEMP	0125 0156 0264 0301
ACTIVE	0009 0024 0040 0048 0060 0073 0075 0085 0134 0177 0177 0183 0185 0194 0204 0221 0270 0281 0322 0322 0329 0331 0333 0341 0352 0356 0358 0358
ARBSET	0004 0005
CLASSI	0006 0007 0017 0028 0040 0048 0058 0060 0071 0082 0095 0131 0177 0183 0185 0322 0329 0331 0333 0352 0356 0358
GAMSPE	0008 0016 0017 0098 0156 0157 0172 0227 0235 0301 0302 0317
GRPING	0002
HMATRX	0002 0008 0015 0160 0168 0305 0313
HRATYR	0006 0021
HSACRE	0006
HXTEMP	0008 0123 0160 0262 0305
IDYLSR	0006
ISCALE	0005
ISOLAT	0033 0064 0135 0135
IUNITS	0005
JFIRST	0211 0215 0219 0231
JOINIM	0090 0117 0127 0129 0131 0229 0256 0266 0276
NHSYRS	0005
NYRSIH	0005
RATMAX	0089 0114 0116 0228 0253 0255 0268
RATOYR	0003 0005
VARESY	0006
VDACES	0006 0017
VOPTIJ	0100 0101 0103 0110 0125 0237 0238 0240 0247 0264
YLDEST	0006

*****FORTRAN CROSS REFERENCE LISTING*****

LABEL	DEFINED	REFERENCES
1	0013	0011
5	0019	0014
10	0022	0020
20	0025	0023
30	0030	0027
35	0036	0086 0180
40	0045	0039 0040
41	0046	0044
50	0054	0047 0048 0050
55	0063	0057 0058 0060
56	0067	0062
57	0076	0070 0071 0073
60	0078	0055
70	0084	0079 0080
80	0087	0082
89	0124	0121
90	0126	0092 0093 0095 0101 0114
100	0143	0138
101	0153	0151
102	0155	0147 0148 0149
110	0161	0158
120	0179	0176
150	0181	0031 0066
160	0189	0182 0183 0185
170	0190	0222 0273 0325
180	0199	0193 0194
181	0200	0198
190	0210	0203 0204 0206
200	0217	0212 0213
201	0218	0216
210	0223	0219
219	0263	0260

*****FORTRAN CROSS REFERENCE LISTING*****

LABEL	DEFINED	REFERENCES
220	0265	0231 0232 0238 0253
230	0274	0268
240	0280	0277
250	0289	0284
251	0300	0293 0294 0295
252	0298	0297
260	0306	0303
270	0314	0321
300	0326	0201
310	0336	0328 0329 0331 0333
319	0348	0345
320	0349	0340 0341
329	0355	0337
330	0360	0355
9035	0362	0034
9056	0363	0067
9057	0364	0068
9058	0365	0069
9059	0366	0075
9090	0367	0110
9091	0368	0112
9160	0369	0187
9210	0370	0225
9220	0371	0104 0241
9221	0372	0106 0243
9222	0373	0108 0245
9223	0374	0247
9224	0375	0249
9225	0376	0251
9230	0377	0271
9252	0378	0152 0298
9260	0379	0162 0307
9261	0381	0166 0311
9262	0382	0168 0313
9263	0383	0170 0315
9264	0384	0172 0317
9265	0385	0174 0319
9266	0386	0164 0309
9310	0386	0350
9311	0387	0352
9320	0388	0356
9321	0389	0358

/ GRPING / SIZE OF PROGRAM 0039C8 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	0004CC	J	SF	I*4	0004D0	II	SF	I*4	0004D4	JJ	F	I*4	0004D8
GAP	C	I*4	NR	IAS	SF	I*4	0004DC	NAS	SFA C	I*4	000000	NHX	SF	I*4	0004E0
HMAT	SFA	R*4	000548	HMIN	S	R*4	0004E4	IDEL	SF	I*4	0004E8	IDSR	F C	I*4	000000
IGRP	SFA	I*4	0004EC	IMIN	SF	I*4	0004F0	INEW	SF	I*4	0004F4	ICUT	C	I*4	0211F4
ISET	SFA	I*4	000930	JGRP	SFA	I*4	0004F8	JOIN	SF C	I*2	000298	LINE	F	I*4	0004FC
NARB	C	I*4	NR	NSET	SFA	I*4	000500	AVOPT	SF XF		000000	DACES	C	R*4	NR
FIND2	SF XF		000000	GROUP	SFA XR	I*4	000000	HTEST	SF	R*4	000D18	ICROP	C	I*4	NR
ILINE	F	I*4	000504	INDEX	S	I*4	000508	INDHX	SF	I*4	001100	ITEMP	SF	I*4	000500
NGRPS	SF	I*4	000510	NUMII	SF	I*4	000514	RATIO	SF	R*4	000518	SFLAG	S	R*4	00051C
SLINE	F	R*4	000520	TAREA	C	R*4	NR	VARTY	C	R*4	NR	VOPTI	SF	R*4	000524
VOPTJ	SF	R*4	000528	VTEMP	SF	R*4	00052C	ACTIVE	SF	I*4	0014EC	ARBSET	C	I*2	NR
CLASS1	F C	I*4	0007D0	GAMSPE	SF	R*4	001804	GRPING		R*4	000530	HMATRX	SF XR	R*4	000000
HRATYR	F C	R*4	0D4A38	HSACRE	C	R*4	NR	HXTEMP	SF	R*4	001CBC	IBCOMM	F XF	I*4	000000
IDYLSR	C	I*4	NR	ISCALE	C	I*4	NR	ISOLAT	SF	I*4	000534	IUNITS	C	I*4	NR
JFIRST	SF	I*4	000538	JOINIM	SF	I*4	00053C	NHSYRS	C	I*4	NR	NYRSIH	C	I*4	NR
RAIMAX	S	R*4	000540	RATOYR	C	I*4	NR	VARESY	C	R*4	NR	VDACES	F C	R*4	000FA0
VOPTI	SFA	R*4	000544	YLDEST	C	R*4	NR								

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * PARAM* SIZE OF BLOCK 0211F8 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NAS	I*4	000000	NHSYRS	I*4	000004 NR	NYRSIH	I*4	000008 NR	RATOYR	I*4	00000C NR
GAP	I*4	000010 NR	ISCALE	I*4	000014 NR	IUNITS	I*4	000018 NR	ICROP	I*4	000158 NR
JOIN	I*2	000298	NARB	I*4	01EAE0 NR	ARBSET	I*2	01EAE4 NR	IOUI	I*4	0211F4

NAME OF COMMON BLOCK * DATA* SIZE OF BLOCK 004E20 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
IDSR	I*4	000000	IDYLSR	I*4	0003E8 NR	CLASS1	I*4	0007D0	DACES	R*4	000808 NR
VDACES	R*4	000FA0	TAREA	R*4	001388 NR	YLDEST	R*4	001770 NR	VARTY	R*4	001858 NR
VARESY	R*4	001F40 NR	HSACRE	R*4	002328 NR	HRATYR	R*4	004A38			

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
1	13	00210C	5	19	00217E	10	22	0021B0	20	25	0021D6
30	30	002214	35	36	002264	40	45	0022BE	41	46	0022D0
50	54	00232A	55	63	002392	56	67	0023C0	57	76	00246C
60	78	00248C	70	84	0024C0	80	87	0024EA	89	124	002718
90	126	002732	100	143	0028D2	101	153	0029AA	102	155	0029C8
110	161	002A40	120	179	002C6A	150	181	002CB0	160	189	002CF6
170	190	002D08	180	199	002D4C	181	200	002D5E	190	210	002DAA
200	217	002DF0	201	218	002E02	210	223	002E24	219	263	0030AC
220	265	0030C6	230	274	003148	240	280	0031BA	250	289	003288
252	298	003354	251	300	0033AC	260	306	003424	270	324	00364C
300	326	003662	310	336	0036FC	319	348	00378A	320	349	00379C
329	355	00386A	330	360	003938						

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	0020FA	100002	12	0020F8	100003	14	002116	100004	15	002122
100005	18	00215E	100006	20	002190	100007	21	002194	100008	23	0021C2
100009	24	0021C6	100010	26	0021E8	100011	28	0021F4	100012	29	00220A
100013	31	002226	100014	33	002230	200001	35	002244	100015	35	002250
100016	40	002278	200002	41	00228C	100017	42	0022A2	100019	48	0022D4
200003	49	0022F8	100020	50	0022FE	100021	52	002312	100022	55	00233C
100023	57	002346	100024	58	00234A	100025	60	002360	200004	61	002376
100026	62	00238E	100027	64	0023A4	100028	65	0023AE	100029	66	0023BC
100030	71	002400	100031	73	002416	100032	75	00242E	100033	77	00247E
100034	80	002490	100035	82	0024AC	100036	85	0024D2	100037	93	002516
100038	95	002532	100039	97	002548	100040	103	0025BE	100041	105	0025A6
100042	106	0025C4	100043	107	0025D0	100046	108	002600	100047	109	00260C
100050	110	00263C	100051	111	002648	100052	112	002674	100053	113	002680
100056	114	0026A8	100057	116	0026B4	100058	120	0026D2	100059	121	0026E0
100060	122	0026E4	100061	125	00272A	100062	127	002744	100063	128	00274E
100064	129	00275C	100065	132	002780	100066	133	00276E	100067	139	002800
100068	144	0028E4	100069	148	002936	100070	149	00293A	100071	151	00296A
100072	152	00296E	100075	154	0029BA	100076	156	0029DA	100077	156	0029EC
100078	159	002A14	100079	162	002A52	200005	163	002A5E	100080	163	002A6A
100081	164	002A90	200006	165	002A9C	100082	165	002AAA	100085	166	002ADC
200007	167	002AE8	100086	167	002AF4	100087	168	002B08	200008	169	002B14
100088	169	002B20	100091	170	002B54	200009	171	002B60	100092	171	002B6C
100095	172	002B9C	200010	173	002BA6	100096	173	002BB4	100099	174	002BE8
200011	175	002BF4	100100	175	002C00	100103	176	002C28	100104	177	002C2C
200012	178	002C42	100105	178	002C5A	100106	180	002C7C	100107	183	002C84
200013	184	002C98	100108	185	002CAC	200014	186	002CC0	100109	187	002CD4
100111	194	002D1C	100112	196	002D30	100114	203	002D68	100115	204	002D6C
100116	206	002D80	100117	208	002D9A	100118	211	002DBC	100119	213	002DC8
100120	215	002DE4	100122	221	002E0C	100123	226	002E44	100124	227	002E60
100125	232	002E94	100126	234	002EB0	100127	240	002EF6	100128	242	002F12
100129	243	002F30	100130	244	002F3C	100133	245	002F6C	100134	246	002F78
100137	247	002FA8	100138	248	002FB4	100139	249	002FE0	100140	250	002FEC
100141	251	003008	100142	252	003014	100145	253	00303C	100146	255	003048
100147	259	003066	100148	260	003074	100149	261	003078	100150	264	0030BE
100151	266	0030D8	100152	267	0030E2	100153	268	0030F0	100154	270	0030FC
100155	272	00311C	100158	273	003144	100159	278	00315C	100160	279	003174
100161	281	00319A	100162	285	0031E6	100163	290	0032CA	100164	294	00331C
100165	295	003320	100166	297	003350	100169	299	00339E	100170	301	0033BE
100171	301	0033D0	100172	304	0033F8	100173	307	003436	200015	308	003442
100174	308	00344E	100175	309	003474	200016	310	003480	100176	310	00348C
100179	311	0034C0	200017	312	0034CC	100180	312	0034D8	100181	313	0034EC
200018	314	0034F8	100182	314	003504	100185	315	00353A	200019	316	003544
100186	316	003550	100189	317	003580	200020	318	0035BC	100190	318	003598
100193	319	0035CC	200021	320	0035D8	100194	320	0035E4	100197	321	00360C
100198	322	003610	200022	323	003624	100199	323	00363C	100200	325	00365E
100201	329	00366E	200023	330	003684	100202	331	003690	200024	332	0036B0
100203	333	0036CB	200025	334	0036DC	100204	335	0036F4	100205	337	00370E
100206	339	003718	100207	341	003724	100208	343	00373C	100209	346	00375E
100210	347	003776	100212	350	0037AE	200026	351	0037BA	100213	351	0037C6

100214	352	0037DC	200027	353	0037E8	100215	353	0037F4	100216	353	003808
100217	353	00385E	100218	354	003862	100219	356	00386E	200028	357	003884
100220	357	00389C	100221	358	0038C8	200029	359	0038DC	200030	359	0038F4
100222	359	00390C	100223	361	00394A						

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
9035	362	000028	9056	363	00002D	9057	364	000069	9058	365	0000A1
9059	366	0000D0	9090	367	0000F6	9091	368	000121	9160	369	000129
9210	370	000168	9220	371	00019C	9221	372	0001AB	9222	373	0001BC
9223	374	0001D3	9224	375	000200	9225	376	000212	9230	377	00021A
9252	378	000222	9260	379	00022A	9266	380	000258	9261	381	00026D
9262	382	000281	9263	383	00028A	9264	384	0002B0	9265	385	0002D0
9310	386	0002D8	9311	387	00033C	9320	388	00034E	9321	389	0003AA

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 389, PROGRAM SIZE = 14792, SUBPROGRAM NAME =GRPING

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 133K BYTES OF CORE NOT USED

REQUESTED OPTIONS:

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(60) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

```
ISN 0002          SUBROUTINE HGAMMA                                                    HGA00010
                  I (    NSET  ,ISET  ,                                                HGA00020
                  O                   HISGAM           )                            HGA00030
C-----------------------------------------------------------------------------------CHGA00040
C                                                                                    CHGA00050
C  S U B R O U T I N E                                                               CHGA00060
C  -------------------                                                               CHGA00070
C      HGAMMA                                                                        CHGA00080
C                                                                                    CHGA00090
C  H I S T O R Y                                                                     CHGA00100
C  -------------                                                                     CHGA00110
C      PROGRAMMER ..............  GARY W. SHAW .LEMSCO ,5/15/81                     CHGA00120
C                                                                                    CHGA00130
C  P U R P O S E                                                                     CHGA00140
C  -------------                                                                     CHGA00150
C      TO CALCULATE THE HISTORICAL ACREAGE RATIOS (GAMMA).                           CHGA00160
C                                                                                    CHGA00170
C  SUBROUTINES REQUIRED                                                              CHGA00180
C  --------------------                                                              CHGA00190
C     NONE                                                                           CHGA00200
C                                                                                    CHGA00210
C  R E M A R K S                                                                     CHGA00220
C  -------------                                                                     CHGA00230
C    1) THERE ARE NYRS1H-1 HISTORICAL GAMMAS TO BE CALCULATED :                      CHGA00240
C                    TIME = 2,3,4....,NYRS1H                                       CHGA00250
C                                                                                    CHGA00260
C    2) A GAMMA IS THE ESTIMATED RATIO OF HISTORICAL ACREAGE FROM ONE                CHGA00270
C            YEAR TO THE PREVIOUS YEAR :                                           CHGA00280
C                GAMMA = HIS_ACREAGE(KYEAR) / HIS_ACREAGE(KYEAR-1)                 CHGA00290
C                                                                                    CHGA00300
C    3) THESE (NYRS1H-1) GAMMAS ARE ESTIMATED FOR A GIVEN SET OF                     CHGA00310
C      STRATA EXPRESSED IN THE VECTOR ISET WHICH HAS A TOTAL OF NSET.                CHGA00320
C                                                                                    CHGA00330
C    4) THE MATHEMATICAL METHOD USED IS A NEWTON-RAPHSON ON EQUATION                 CHGA00340
C       4.19 OF AL FIEVISONS PAPER.                                                  CHGA00350
C-----------------------------------------------------------------------------------CHGA00360
ISN 0003          INTEGER    RATOYR  ,GAP                                           HGA00370
ISN 0004          INTEGER*2  JOIN, ARBSET                                           HGA00380
ISN 0005          COMMON /PARAM/NAS          ,NHSYRS       ,NYRS1H       ,         HGA00390
                  #              RATOYR      ,GAP                        ,         HGA00400
                  #              ISCALE      ,IUNITS(80)   ,ICROP(80)    ,         HGA00410
                  #              JOIN(250,250) ,NARB       ,ARBSET(20,250),         HGA00420
                  #              IOUT                                              HGA00430
ISN 0006          INTEGER    CLASS1                                                HGA00440
ISN 0007          COMMON /DATA/ IDSR(250)    ,IDYLSR(250)                  ,       HGA00450
                  #              CLASS1(250) ,                                     HGA00460
                  #              DACES(250)  ,VDACES(250) ,TAREA(250)    ,         HGA00470
                  #              YLDEST(250) ,VARTY(250)  ,VARESY(250)   ,         HGA00480
                  #              HSACRE(250,10) ,HRATYR(250)                       HGA00490
C-----------------------------------------------------------------------------------CHGA00500
C    DIMENSION FOR LOCAL VARIBLES.                                                 CHGA00510
C-----------------------------------------------------------------------------------CHGA00520
ISN 0008          REAL  LEFT                                                        HGA00530
ISN 0009          DIMENSION ISET(NSET)  ,HISGAM(1)                                  HGA00540
ISN 0010          DATA   NITMAX /26/                                                HGA00550
C-----------------------------------------------------------------------------------CHGA00560
C THE FIRST ELEMENT OF HISGAM IS NOT USED AND IS THUS SET TO ZERO.                 CHGA00570
C-----------------------------------------------------------------------------------CHGA00580
ISN 0011          HISGAM(1) = 0.0                                                   HGA00590
C-----------------------------------------------------------------------------------CHGA00600
C                                                                                    CHGA00610
C          IF WE ONLY HAVE ONE YEAR OF HISTORICAL DATA. THIS METHOD                  CHGA00620
C WILL NOT WORK.                                                                   CHGA00630
C-----------------------------------------------------------------------------------CHGA00640
ISN 0012          IF (NYRS1H.LT.2) STOP 50001                                       HGA00650
C**********************************************************************************CHGA00660
C                                                                                    CHGA00670
C        THE NUMBER OF YEARS USED TO ESTIMATE THE H MATRIX IS GIVEN                  CHGA00680
C IN THE VARIABLE  NYRS1H  WHICH IS OUT OF THE  **FIRST**  NYRS1H                   CHGA00690
C YEARS OF THE TOTAL  NHSYRS YEARS.                                                CHGA00700
C                                                                                    CHGA00710
C   THE FOLLOWING LOOP IS THUS FOR EACH OF THE YEARS 2,3,4,....,NYRS1H.            CHGA00720
C-----------------------------------------------------------------------------------CHGA00730
```

```
ISN 0014          DO 100 KYEAR = 2,NYRS1H                                    HGA00740
ISN 0015            HPMAX = 0.0                                              HGA00750
ISN 0016            TOP   = 0.0                                              HGA00760
ISN 0017            BOT   = 0.0                                              HGA00770
ISN 0018            DO 10 I =1,NSET                                          HGA00780
ISN 0019               IAS    = ISET(I)                                      HGA00790
ISN 0020               IF (TAREA(IAS).EQ.0) STOP 50010                       HGA00800
ISN 0022               KYRM1 = KYEAR - 1                                     HGA00810
ISN 0023               HISPRO = HSACRE(IAS,KYRM1) / TAREA(IAS)               HGA00820
ISN 0024               TOP = TOP + HSACRE(IAS,KYEAR)                         HGA00830
ISN 0025               BOT = BOT + HSACRE(IAS,KYRM1)                         HGA00840
ISN 0026               IF (HISPRO.GT.HPMAX)  HPMAX = HISPRO                  HGA00850
ISN 0028         10    CONTINUE                                              HGA00860
ISN 0029            IF (TOP.LT.1.0E-5) GO TO 80                              HGA00870
                 C                                                           HGA00880
                 C  INITIALIZE HISGAM(KYEAR)                                 HGA00890
                 C                                                           HGA00900
ISN 0031            IF (BOT.EQ.0) STOP 50011                                 HGA00910
ISN 0033            HISGAM(KYEAR) = TOP / BOT                                HGA00920
ISN 0034            IF (HPMAX.EQ.0) STOP 50012                               HGA00930
ISN 0036            GMAX          = .995 / HPMAX                             HGA00940
ISN 0037            NITER         = 0                                        HGA00950
                 C                                                           HGA00960
ISN 0038         20 CONTINUE                                                 HGA00970
ISN 0039            SUM1  = 0.0                                              HGA00980
ISN 0040            SUM2  = 0.0                                              HGA00990
ISN 0041            XD    = 0.0                                              HGA01000
ISN 0042            NITER = NITER + 1                                        HGA01010
ISN 0043            IF (NITER.GT.NITMAX) GO TO 91                            HGA01020
ISN 0044            DO 25 I = 1,NSET                                         HGA01030
ISN 0046              IAS = ISET(I)                                          HGA01040
ISN 0047              XD  = XD  +  HSACRE(IAS,KYEAR)   / TAREA(IAS)          HGA01050
ISN 0048              H   =        HSACRE(IAS,KYRM1) / TAREA(IAS)          HGA01060
ISN 0049              W   = H  * (1.0-HSACRE(IAS,KYEAR) / TAREA(IAS))       HGA01070
ISN 0050              E   = H  * HISGAM(KYEAR)                               HGA01080
ISN 0051              IF (E.EQ.1) STOP 50025                                 HGA01090
ISN 0053              SUM1= SUM1 + W    / (1.0-E)                            HGA01100
ISN 0054              SUM2= SUM2 + W * H/ (1.0-E)**2                         HGA01110
ISN 0055         25 CONTINUE                                                 HGA01120
                 C                                                           HGA01130
ISN 0056            IF (HISGAM(KYEAR).EQ.0) STOP 50026                       HGA01140
ISN 0058            DEM = SUM2 + XD/HISGAM(KYEAR)**2                         HGA01150
ISN 0059            IF (DEM.EQ.0) STOP 50027                                 HGA01160
ISN 0061            DELTA = -(SUM1 - XD/HISGAM(KYEAR)) / DEM                 HGA01170
ISN 0062            RELDEL= ABS(DELTA / HISGAM(KYEAR))                       HGA01180
ISN 0063            IF (RELDEL.LT.1.0E-5) GO TO 91                           HGA01190
                 C                                                           HGA01200
ISN 0065            HISGAM(KYEAR) = HISGAM(KYEAR) + DELTA                    HGA01210
                 C                                                           HGA01220
ISN 0066            IF (HISGAM(KYEAR).GT.GMAX)   HISGAM(KYEAR) = GMAX        HGA01230
ISN 0068            IF (HISGAM(KYEAR).LT..005)   HISGAM(KYEAR) = .005        HGA01240
ISN 0070            GO TO 20                                                 HGA01250
                 C                                                           HGA01260
ISN 0071         80 CONTINUE                                                 HGA01270
ISN 0072                    HISGAM(KYEAR) = 0.0                              HGA01280
ISN 0073                    GO TO 100                                        HGA01290
                 C                                                           HGA01300
ISN 0074         90 CONTINUE                                                 HGA01310
ISN 0075                 IF (BOT.EQ.0) STOP 50090                            HGA01320
ISN 0077                 HISGAM(KYEAR) = TOP / BOT                           HGA01330
                 C                                                           HGA01340
                 C  CHECKING TO SEE IF THE ESTIMATED GAMMA HATS FOUND DO SATISFY HGA01350
                 C EQUATION 4.19.                                            HGA01360
                 C                                                           HGA01370
ISN 0078         91 LEFT = 0.0                                               HGA01380
ISN 0079            DO 95 I = 1,NSET                                         HGA01390
ISN 0080              IAS = ISET(I)                                          HGA01400
ISN 0081              IF (TAREA(IAS).EQ.0.0)     STOP 50095                  HGA01410
ISN 0083              IF (HISGAM(KYEAR).EQ.0.0) STOP 50096                   HGA01420
ISN 0085              LEFT = LEFT + (HSACRE(IAS,KYEAR)/TAREA(IAS)) / HISGAM(KYEAR) HGA01430
ISN 0086         95 CONTINUE                                                 HGA01440
ISN 0087            RIGHT = 0.0                                              HGA01450
ISN 0088            DO 96 I = 1,NSET                                         HGA01460
ISN 0089              IAS = ISET(I)                                          HGA01470
ISN 0090              IF (TAREA(IAS).EQ.0.0) STOP 50097                      HGA01480
ISN 0092              RIGHT = RIGHT + (1.0-HSACRE(IAS,KYEAR)/TAREA(IAS))     HGA01490
                    #                 * HSACRE(IAS,KYEAR-1) / TAREA(IAS)    HGA01500
                    #                 / (1.0-HISGAM(KYEAR)                  HGA01510
```

```
                      *                          * HSACRE(IAS,KYEAR-1)/TAREA(IAS) )          HGA01520
   ISN 0093             96 CONTINUE                                                          HGA01530
   ISN 0094                IF (ABS(LEFT-RIGHT).GT.10.0E-4) STOP 50098                        HGA01540
                     C*************************************************************CHGA01550
                     C                                                                      HGA01560
                     C  END OF DO LOOP FOR THE KYEARS = 2,NYRS1H                            HGA01570
                     C                                                                      HGA01580
   ISN 0096             100 CONTINUE                                                         HGA01590
   ISN 0097                 RETURN                                                           HGA01600
   ISN 0098                 END                                                              HGA01610
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS
E	0050 0051 0053 0054
H	0048 0049 0050 0054
I	0018 0019 0045 0046 0079 0080 0088 0089
W	0049 0053 0054
XD	0041 0047 0047 0058 0061
ABS	0062 0094
BOT	0017 0025 0025 0031 0033 0075 0077
DEM	0058 0059 0061
GAP	0003 0005
IAS	0019 0020 0023 0023 0024 0025 0046 0047 0047 0048 0048 0049 0049 0080 0081 0085 0085 0089 0090 0092 0092 0092 0092 0092 0092
NAS	0005
TOP	0016 0024 0024 0029 0033 0077
GMAX	0036 0066 0066
IDSR	0007
IOUT	0005
ISET	0002 0009 0019 0046 0080 0089
JOIN	0004 0005
LEFT	0008 0078 0085 0085 0094
NARB	0005
NSET	0002 0009 0018 0045 0079 0088
SUM1	0039 0053 0053 0061
SUM2	0040 0054 0054 0058
DACES	0007
DELTA	0061 0062 0065
HPMAX	0015 0026 0026 0034 0036
ICROP	0005
KYEAR	0014 0022 0024 0033 0047 0049 0050 0056 0058 0061 0062 0065 0065 0066 0066 0068 0068 0072 0077 0083 0085 0092 0092 0092 0092
KYRM1	0022 0023 0025 0048
NITER	0037 0042 0042 0043
RIGHT	0087 0092 0092 0094
TAREA	0007 0020 0023 0047 0048 0049 0081 0085 0090 0092 0092 0092
VARTY	0007
ARBSET	0004 0005
CLASS1	0006 0007
HGAMMA	0002
HISGAM	0002 0009 0011 0033 0050 0056 0058 0061 0062 0065 0065 0066 0066 0068 0068 0072 0077 0083 0085 0092
HISPRO	0023 0026 0026
HRATYR	0007
HSACRE	0007 0023 0024 0025 0047 0048 0049 0085 0092 0092 0092
IDYLSR	0007
ISCALE	0005
IUNITS	0005
NHSYRS	0005
NITMAX	0010 0043
NYRS1H	0005 0012 0014
RATOYR	0003 0005
RELDEL	0062 0063
VARESY	0007
VDACES	0007
YLDEST	0007

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES
10	0028	0018
20	0038	0070
25	0055	0045
80	0071	0029
90	0074	
91	0078	0043 0063
95	0086	0079

*****FORTRAN CROSS REFERENCE LISTING*****

LABEL	DEFINED	REFERENCES
96	0093	0088
100	0096	0014 0073

/ HGAMMA / SIZE OF PROGRAM 000684 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
E	SF	R*4	0000B0	H	SF	R*4	0000B4	I	SF	I*4	0000B8	W	SF	R*4	0000BC
XD	SF	R*4	0000C0	BOT	SF	R*4	0000C4	DEM	SF	R*4	0000C8	GAP	C	I*4	NR
IAS	SF	I*4	0000CC	NAS	C	I*4	NR	TOP	SF	R*4	0000D0	GMAX	SF	R*4	0000D4
IDSR	C	I*4	NR	IOUT	C	I*4	NR	ISET	F XR	I*4	000000	JOIN	C	I*2	NR
LEFT	SFA	R*4	0000D8	NARB	C	I*4	NR	NSET	F	I*4	0000DC	SUM1	SF	R*4	0000E0
SUM2	SF	R*4	0000E4	DACES	C	R*4	NR	DELTA	SFA	R*4	0000E8	HPMAX	SF	R*4	0000EC
ICROP	C	I*4	NR	KYEAR	SFA	I*4	0000F0	KYRM1	SF	I*4	0000F4	NITER	SF	I*4	0000F8
RIGHT	SFA	R*4	0000FC	TAREA	F C	R*4	001388	VARTY	C	R*4	NR	ARBSET	C	I*2	NR
CLASS1	C	I*4	NR	HGAMMA		R*4	000100	HISGAM	SFA XR	R*4	000000	HISPRO	SF	R*4	000104
HRATYR	C	R*4	NR	HSACRE	F C	R*4	002328	IBCOM#	XF	I*4	000000	IDYLSR	C	I*4	NR
ISCALE	C	I*4	NR	IUNITS	C	I*4	NR	NHSYRS	C	I*4	NR	NITMAX		I*4	000108
NYRS1H	F C	I*4	000008	RATOYR	C	I*4	NR	RELDEL	S	R*4	00010C	VARESY	C	R*4	NR
VDACES	C	R*4	NR	YLDEST	C	R*4	NR								

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * PARAM* SIZE OF BLOCK 0211F8 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NAS	I*4	000000 NR	NHSYRS	I*4	000004 NR	NYRS1H	I*4	000008	RATOYR	I*4	00000C NR
GAP	I*4	000010 NR	ISCALE	I*4	000014 NR	IUNITS	I*4	000018 NR	ICROP	I*4	000158 NR
JOIN	I*2	000298 NR	NARB	I*4	01EAE0 NR	ARBSET	I*2	01EAE4 NR	IOUT	I*4	0211F4 NR

NAME OF COMMON BLOCK * DATA* SIZE OF BLOCK 004E20 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
IDSR	I*4	000000 NR	IDYLSR	I*4	0003E8 NR	CLASS1	I*4	0007D0 NR	DACES	R*4	000888 NR
VDACES	R*4	000FA0 NR	TAREA	R*4	001388	YLDEST	R*4	001770 NR	VARTY	R*4	001858 NR
VARESY	R*4	001F40 NR	HSACRE	R*4	002328	HRATYR	R*4	004A38 NR			

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
10	28	000224	20	38	000292	25	55	00038A	80	71	00046C
90	74	00047A NR	91	78	0004A4	95	86	00052A	96	93	0005EC
100	96	000616									

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	00013C	100002	13	000164	100003	14	000172	100004	15	000176
100005	19	000186	100006	21	0001A6	100007	22	0001B4	100008	27	000220
100009	29	000230	100010	31	00023C	100011	32	000246	100012	33	000254
100013	35	000270	100014	36	00027E	100015	45	0002B2	100016	46	000286
100017	52	00034A	100018	53	000358	100019	56	000396	100020	57	0003A6
100021	58	0003B4	100022	60	0003D2	100023	61	0003E0	100024	65	000414
100025	67	00043A	100026	68	000448	100027	69	00045A	100028	70	000468
100029	76	000484	100030	77	000492	100031	80	0004AC	100032	82	0004CC
100033	83	0004DA	100034	84	0004EA	100035	85	0004FA	100036	87	000536
100037	89	00053E	100038	91	00055E	100039	92	00056C	100040	94	0005F8
100041	95	000608	100042	97	000626						

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 97, PROGRAM SIZE = 1668, SUBPROGRAM NAME =HGAMMA

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 205K BYTES OF CORE NOT USED

REQUESTED OPTIONS:

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

```
ISN 0002            SUBROUTINE I4A1BN(IFLD,NCHFLD,NCVTED)                                I4A00010
                C-------------------------------------------------------------------C    I4A00020
                C                                                                   C    I4A00030
                C  S U B R O U T I N E                                              C    I4A00040
                C  -------------------                                              C    I4A00050
                C  I4A1BN                                                           C    I4A00060
                C                                                                   C    I4A00070
                C  H I S T O R Y                                                    C    I4A00080
                C  -------------                                                    C    I4A00090
                C  PROGRAMMER.............DAVID LEE SMITH, 9/9/77                  C    I4A00100
                C                                                                   C    I4A00110
                C  P U R P O S E                                                    C    I4A00120
                C  -------------                                                    C    I4A00130
                C  THIS SUBROUTINE ACCEPTS AN ARRAY OF EBCDIC CHARACTERS AND CONVERTS C  I4A00140
                C  EBCDIC DIGITS TO A BINARY INTEGER.                               C    I4A00150
                C                                                                   C    I4A00160
                C  SUBROUTINES REQUIRED                                             C    I4A00170
                C  --------------------                                             C    I4A00180
                C  NONE                                                             C    I4A00190
                C                                                                   C    I4A00200
                C  R E M A R K S                                                    C    I4A00210
                C  -------------                                                    C    I4A00220
                C  CALLING SEQUENCE:                                                C    I4A00230
                C     CALL I4A1BN( FIELD, LENGTH, OUTPUT )                          C    I4A00240
                C     WHERE  FIELD IS THE FIRST WORD OF AN ARRAY OF EBCDIC          C    I4A00250
                C     CHARACTERS TO BE CONVERTED TO BINARY.  CHARACTERS STORED ONE  C    I4A00260
                C     PER WORD, LEFT JUSTIFIED, AS BY AN A1 FORMAT.                 C    I4A00270
                C     LENGTH IS THE NUMBER OF CHARACTERS IN THE FIELD,              C    I4A00280
                C     AND OUTPUT IS THE ONE WORD RESULT.                            C    I4A00290
                C-------------------------------------------------------------------C    I4A00300
                C                                                                        I4A00310
                C                                                                        I4A00320
ISN 0003            INTEGER * 4  IDUM(2), IFLD(20)                                       I4A00330
ISN 0004            LOGICAL * 1 L(8)                                                     I4A00340
ISN 0005            EQUIVALENCE (L(1),IDUM(1)),(ILCH,IDUM(1)),(ICHAR,IDUM(2))            I4A00350
ISN 0006            DATA ICHAR / 0 /                                                     I4A00360
ISN 0007            DATA IR0   / 240 /                                                   I4A00370
ISN 0008            DATA IR9   / 249 /                                                   I4A00380
ISN 0009            DATA IRBL  / 64 /                                                    I4A00390
ISN 0010            DATA IRPL  / 78 /                                                    I4A00400
ISN 0011            DATA IRMI  / 96 /                                                    I4A00410
ISN 0012            NCVTED = 0                                                           I4A00420
ISN 0013            IERFLG = 0                                                           I4A00430
ISN 0014            MINUS = 1                                                            I4A00440
ISN 0015            DO 30 I = 1, NCHFLD                                                  I4A00450
ISN 0016            ILCH = IFLD( I )                                                     I4A00460
ISN 0017            L(8) = L(1)                                                          I4A00470
ISN 0018            IF ( ICHAR .LT. IR0 ) GO TO 10                                       I4A00480
ISN 0020            IF ( ICHAR .GT. IR9 ) GO TO 10                                       I4A00490
ISN 0022            JDIG = I                                                             I4A00500
ISN 0023            GO TO 200                                                            I4A00510
ISN 0024        10  NEXT = I + 1                                                         I4A00520
ISN 0025            IF ( ICHAR .EQ. IRBL ) GO TO 30                                      I4A00530
ISN 0027            IF ( ICHAR .EQ. IRPL ) GO TO 100                                     I4A00540
ISN 0029            IF ( ICHAR .NE. IRMI ) GO TO 20                                      I4A00550
ISN 0031            MINUS = - MINUS                                                      I4A00560
ISN 0032            GO TO 100                                                            I4A00570
ISN 0033        20  IERFLG = I                                                           I4A00580
ISN 0034        30  CONTINUE                                                            I4A00590
ISN 0035            IERFLG = NCHFLD + 1                                                  I4A00600
ISN 0036            GO TO 240                                                            I4A00610
ISN 0037        100 IF ( NEXT .GT. NCHFLD ) GO TO 130                                    I4A00620
ISN 0039            DO 120 I = NEXT, NCHFLD                                              I4A00630
ISN 0040            ILCH = IFLD( I )                                                     I4A00640
ISN 0041            L(8) = L(1)                                                          I4A00650
ISN 0042            IF (ICHAR .LT. IR0 ) GO TO 110                                       I4A00660
ISN 0044            IF (ICHAR .GT. IR9 ) GO TO 110                                       I4A00670
ISN 0046            JDIG = I                                                             I4A00680
ISN 0047            GO TO 200                                                            I4A00690
ISN 0048        110 IF ( ICHAR .EQ. IRBL ) GO TO 120                                     I4A00700
ISN 0050            IERFLG = I                                                           I4A00710
ISN 0051        120 CONTINUE                                                             I4A00720
ISN 0052        130 IERFLG = NCHFLD + 1                                                  I4A00730
```

```
   ISN 0053           GO TO 240                                                    I4A00740
   ISN 0054      200  DO 230 I = JDIG, NCHFLD                                     I4A00750
   ISN 0055           ILCH = IFLD( I )                                            I4A00760
   ISN 0056           L(8) = L(1)                                                 I4A00770
   ISN 0057           IF ( ICHAR .LT. IR0 ) GO TO 210                             I4A00780
   ISN 0059           IF ( ICHAR .LE. IR9) GO TO 220                              I4A00790
   ISN 0061      210  IF (ICHAR .NE. IRBL ) IERFLG = I                           I4A00800
   ISN 0063           ICHAR = IR0                                                 I4A00810
   ISN 0064      220  IVAL = ICHAR - IR0                                         I4A00820
   ISN 0065           NCVTED = NCVTED * 10  -  IVAL                               I4A00830
   ISN 0066      230  CONTINUE                                                    I4A00840
   ISN 0067           IF ( MINUS .EQ. 1 ) NCVTED = - NCVTED                       I4A00850
   ISN 0069      240  IF ( IERFLG .EQ. 0 ) GO TO 250                             I4A00860
   ISN 0071           NCH = NCHFLD                                                I4A00870
   ISN 0072           IF ( NCH .GT. 80 ) NCH = 80                                 I4A00880
   ISN 0074           WRITE ( 6, 1000 ) IERFLG, NCHFLD, (IFLD(K), K = 1, NCH )    I4A00890
   ISN 0075      1000 FORMAT(' EBCDIC TO BINARY INTEGER CONVERSION ERROR'/' AT CHARACTER I4A00900
                     1 ',I5,' OF ',I5,' CHARACTER FIELD:'/1X,80A1)                 I4A00910
   ISN 0076      250  RETURN                                                      I4A00920
   ISN 0077           END                                                         I4A00930
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS															
I	0015	0016	0022	0024	0033	0039	0040	0046	0050	0054	0055	0061				
K	0074	0074	0074													
L	0004	0005	0017	0017	0041	0041	0056	0056								
IR0	0007	0018	0042	0057	0063	0064										
IR9	0008	0020	0044	0059												
NCH	0071	0072	0072	0074												
IDUM	0003	0005	0005	0005												
IFLD	0002	0003	0016	0040	0055	0074										
ILCH	0005	0016	0040	0055												
IRBL	0009	0025	0048	0061												
IRMI	0011	0029														
IRPL	0010	0027														
IVAL	0064	0065														
JDIG	0022	0046	0054													
NEXT	0024	0037	0039													
ICHAR	0005	0006	0018	0020	0025	0027	0029	0042	0044	0048	0057	0059	0061	0063	0064	
MINUS	0014	0031	0031	0067												
IERFLG	0013	0033	0035	0050	0052	0061	0069	0074								
I4A18N	0002															
NCHFLD	0002	0015	0035	0037	0039	0052	0054	0071	0074							
NCVTED	0002	0012	0065	0065	0067	0067										

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES	
10	0024	0018	0020
20	0033	0029	
30	0034	0015	0025
100	0037	0027	0032
110	0048	0042	0044
120	0051	0039	0048
130	0052	0037	
200	0054	0023	0047
210	0061	0057	
220	0064	0059	
230	0066	0054	
240	0069	0036	0053
250	0076	0069	
1000	0075	0074	

/ I4A18N / SIZE OF PROGRAM 000382 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	0000FC	K	F	I*4	000100	L	SF E	L*1	000148	IR0	F	I*4	000104
IR9		I*4	000108	NCH	SF	I*4	00010C	IDUM	E	I*4	000148	IFLD	F XR	I*4	000000
ILCH	S E	I*4	000148	IRBL		I*4	000110	IRMI		I*4	000114	IRPL		I*4	000118
IVAL	SF	I*4	00011C	JDIG	SF	I*4	000120	NEXT	SF	I*4	000124	ICHAR	SF E	I*4	00014C
MINUS	SF	I*4	000128	IHCOMM	F XF	I*4	000000	IERFLG	SF	I*4	00012C	I4A18N		I*4	000130
NCHFLD	F	I*4	000134	NCVTED	SF	I*4	000138								

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
10	24	0001C0	20	33	0001F2	30	34	0001F6	100	37	00020E
110	48	000252	120	51	000262	130	52	00026C	200	54	00027A
210	61	0002AA	220	64	0002BE	230	66	0002D2	240	69	0002E4
250	76	000348									

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	000164	100002	16	00018C	100003	20	0001AC	100004	22	0001B8
100005	27	0001D4	100006	29	0001E0	100007	31	0001EC	100008	35	000200
100009	39	00021A	100010	40	00021E	100011	44	00023E	100012	46	00024A
100013	50	00025E	100015	55	00027E	100016	59	00029E	100017	62	0002B6
100018	63	0002BA	100019	67	0002DC	100020	68	0002E2	100021	71	0002EE
100022	73	0002FF	100023	74	000306						

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
1000	75	000028									

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 76, PROGRAM SIZE = 946, SUBPROGRAM NAME =I4A1BN

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 213K BYTES OF CORE NOT USED

REQUESTED OPTIONS:

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

```
ISN 0002            FUNCTION NUMBR (LINE, NUMVEC)                                  NUM00010
                    C-------------------------------------------------------------- CNUM00020
                    C                                                              CNUM00030
                    C  F U N C T I O N                                             CNUM00040
                    C ---------------                                              CNUM00050
                    C     NUMBR                                                    CNUM00060
                    C                                                              CNUM00070
                    C  H I S T O R Y                                               CNUM00080
                    C -------------                                                CNUM00090
                    C     PROGRAM ADOPTED FROM COMMON LIBRARY                      CNUM00100
                    C                                                              CNUM00110
                    C  P U R P O S E                                               CNUM00120
                    C -------------                                                CNUM00130
                    C     THIS SUBROUTINE MOVES NUMBERS FROM A LINE TO ARRAY NUMVEC, CNUM00140
                    C     AND STORES A COUNT OF NUMBERS IN NUMBR.                  CNUM00150
                    C     THIS IS A SIMPLIFIED VERSION OF NUMBER.                  CNUM00160
                    C                                                              CNUM00170
                    C  SUBROUTINES REQUIRED                                        CNUM00180
                    C --------------------                                         CNUM00190
                    C                                                              CNUM00200
                    C     I4A1BN                                                   CNUM00210
                    C                                                              CNUM00220
                    C  R E M A R K S                                               CNUM00230
                    C -------------                                                CNUM00240
                    C   NONE                                                       CNUM00250
                    C-------------------------------------------------------------- CNUM00260
                    C                                                              NUM00270
ISN 0003            C     IMPLICIT INTEGER (A-Z)                                   NUM00280
                    C                                                              NUM00290
ISN 0004            C     DIMENSION LINE(1),NUMVEC(1)                              NUM00300
ISN 0005            C     DATA    BLANK/' '/,COMMA/','/                            NUM00310
ISN 0006            C     DATA MINUS /'-'/, KAMPER/'&'/                            NUM00320
ISN 0007            C     DATA IZERO/'0'/,NINE/'9'/                                NUM00330
                    C                                                              NUM00340
                    C  ITRIG = SWITCH FOR NUMBER COLLECTED AND NOT STORED          NUM00350
ISN 0008            C     ITRIG = 0                                                NUM00360
ISN 0009            C     INEG = 1                                                 NUM00370
ISN 0010            C     NUM = 0                                                  NUM00380
ISN 0011            C     NDEX = 0                                                 NUM00390
                    C                                                              NUM00400
ISN 0012            30    DO 60  COL=11,80                                         NUM00410
ISN 0013            C     IF (LINE(COL).EQ.KAMPER) GO TO 70                        NUM00420
ISN 0015            C     IF (LINE(COL).EQ.MINUS) GO TO 40                         NUM00430
ISN 0017            C     IF (LINE(COL).EQ.BLANK) GO TO 60                         NUM00440
ISN 0019            C     IF (LINE(COL).EQ.COMMA) GO TO 50                         NUM00450
ISN 0021            C     IF(LINE(COL).LT.IZERO.OR.LINE(COL).GT.NINE) GO TO 90     NUM00460
ISN 0023            C     CALL I4A1BN(LINE(COL),1,NWORD)                           NUM00470
ISN 0024            C     NUM = 10 * NUM + NWORD                                   NUM00480
ISN 0025            C     ITRIG=1                                                  NUM00490
ISN 0026            C     GO TO 60                                                 NUM00500
                    C                                                              NUM00510
                    C  MINUS SIGN                                                  NUM00520
ISN 0027            40    INEG = -1                                                NUM00530
ISN 0028            C      GO TO 60                                                NUM00540
                    C                                                              NUM00550
                    C  END OF NUMBER, INEG IS SET TO 1 OR -1                       NUM00560
ISN 0029            50    NDEX = NDEX + 1                                          NUM00570
ISN 0030            C     NUMVEC(NDEX) = NUM * INEG                                NUM00580
ISN 0031            C     INEG = 1                                                 NUM00590
ISN 0032            C     ITRIG = 0                                                NUM00600
ISN 0033            C     NUM = 0                                                  NUM00610
ISN 0034            60 CONTINUE                                                    NUM00620
ISN 0035            C     GO TO 90                                                 NUM00630
                    C                                                              NUM00640
                    C  CONTINUATION CARD                                           NUM00650
ISN 0036            70    READ(4, 71) KEYWD, (LINE(I), I = 11,80)                  NUM00660
ISN 0037            71    FORMAT(A4,6X,70A1)                                       NUM00670
ISN 0038            C     WRITE(6,72) KEYWD, (LINE(I), I = 11,80)                  NUM00680
ISN 0039            72    FORMAT(5X,A4,1X,70A1)                                    NUM00690
ISN 0040            C     GO TO 30                                                 NUM00700
ISN 0041            90 IF(ITRIG.EQ.0)GO TO 100                                     NUM00710
ISN 0043            C     NDEX = NDEX + 1                                          NUM00720
                                                                                   NUM00730
```

```
   ISN 0044            NUMVEC(NDEX) = NUM * INEG                          NUM00740
                       C                                                  NUM00750
   ISN 0045        100 NUMBR = NDEX                                       NUM00760
   ISN 0046            RETURN                                             NUM00770
   ISN 0047            END                                                NUM00780
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS									
I	0036	0036	0036	0038	0038	0038				
COL	0012	0013	0015	0017	0019	0021	0021	0023		
NUM	0010	0024	0024	0030	0033	0044				
INEG	0009	0027	0030	0031	0044					
LINE	0002	0004	0013	0015	0017	0019	0021	0021	0023	0036	0038
NDEX	0011	0029	0029	0030	0043	0043	0044	0045		
NINE	0007	0021								
BLANK	0005	0017								
COMMA	0005	0019								
ITRIG	0008	0025	0032	0041						
IZERO	0007	0021								
KEYWD	0036	0038								
MINUS	0006	0015								
NUMBR	0002	0045								
NWORD	0023	0024								
I4A1BN	0023									
KAMPER	0006	0013								
NUMVEC	0002	0004	0030	0044						

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES			
30	0012	0040			
40	0027	0015			
50	0029	0019			
60	0034	0012	0017	0026	0028
70	0036	0013			
71	0037	0036			
72	0039	0038			
90	0041	0021	0035		
100	0045	0041			

/ NUMBR / SIZE OF PROGRAM 0002F2 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	F	I*4	000084	COL	SFA	I*4	00008B	NUM	SF	I*4	00008C	INEG	SF	I*4	0000C0
LINE	SFA XR	I*4	000000	NDEX	SF	I*4	0000C4	NINE		I*4	0000C8	BLANK		I*4	0000CC
COMMA		I*4	0000D0	ITRIG	S	I*4	0000D4	IZERO		I*4	0000D8	KEYWD	SF	I*4	0000DC
MINUS		I*4	0000E0	NUMBR	S	I*4	0000E4	NWORD	SFA	I*4	0000E8	IBCOM#	F XF	I*4	000000
I4A1BN	SF XF		000000	KAMPER		I*4	0000EC	NUMVEC	S XR	I*4	000000				

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
30	12	000136	40	27	0001D2	50	29	0001DC	60	34	0001FA
70	36	00020A	90	41	000270	100	45	00028C			

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	000110	100002	13	00013A	100003	15	00014C	100004	17	00015E
100005	19	000170	100006	21	000182	200001	22	000194	100007	23	0001A6
100008	35	000206	100013	43	000276						

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
71	37	000028	72	39	000032						

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 46, PROGRAM SIZE = 754, SUBPROGRAM NAME = NUMBR

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ******
221K BYTES OF CORE NOT USED

REQUESTED OPTIONS:

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

```
ISN 0002          SUBROUTINE PREST                                                  PRE00010
                C-----------------------------------------------------------------CPRE00020
                C                                                                  CPRE00030
                C  S U B R O U T I N E                                             CPRE00040
                C  -------------------                                             CPRE00050
                C      PREST                                                       CPRE00060
                C                                                                  CPRE00070
                C  H I S T O R Y                                                   CPRE00080
                C  -------------                                                   CPRE00090
                C      PROGRAMMER ..............  GARY W. SHAW ,LEMSCO ,5/15/81   CPRE00100
                C                                                                  CPRE00110
                C  P U R P O S E                                                   CPRE00120
                C  -------------                                                   CPRE00130
                C      TO CALCULATE AND SET NECESSARY VARIABLES NEEDED IN THE      CPRE00140
                C  ESTIMATION STEP.                                                CPRE00150
                C                                                                  CPRE00160
                C  SUBROUTINES REQUIRED                                            CPRE00170
                C  --------------------                                            CPRE00180
                C      NONE                                                        CPRE00190
                C                                                                  CPRE00200
                C  R E M A R K S                                                   CPRE00210
                C  -------------                                                   CPRE00220
                C                                                                  CPRE00230
                C      MOST ALL VALUES CALCULATED HERE ARE PLACED INTO THE COMMON  CPRE00240
                C  BLOCK OF EST.                                                   CPRE00250
                C-----------------------------------------------------------------CPRE00260
ISN 0003          INTEGER  RATOYR ,GAP                                             PRE00270
ISN 0004          INTEGER*2  JOIN, ARBSET                                          PRE00280
ISN 0005          COMMON /PARAM/NAS          ,NHSYRS      ,NYRS1H      ,         PRE00290
                #             RATOYR         ,GAP                      ,         PRE00300
                #             ISCALE         ,IUNITS(80)  ,ICROP(80)   ,         PRE00310
                #             JOIN(250,250)  ,NARB        ,ARBSET(20,250),         PRE00320
                #             IOUT                                                 PRE00330
ISN 0006          INTEGER  CLASS1                                                  PRE00340
ISN 0007          COMMON /DATA/ IDSR(250)    ,IDYLSR(250)                 ,       PRE00350
                #             CLASS1(250)    ,                                     PRE00360
                #             DACES(250)     ,VDACES(250) ,TAREA(250)    ,         PRE00370
                #             YLDEST(250)    ,VARTY(250)  ,VARESY(250)   ,         PRE00380
                #             HSACRE(250,10) ,HRATYR(250)                          PRE00390
                C                                                                  PRE00400
ISN 0008          INTEGER GROUP                                                    PRE00410
ISN 0009          COMMON /EST/ NGRPS         ,GROUP(250)      ,HMATRX(250)  ,     PRE00420
                #             BMATRX(250)                                  ,     PRE00430
                #             GAMMA(250)   ,XMATRX(250,250) ,X0C1(250)   ,     PRE00440
                #             NUMYS        ,IYDSEQ(50)      ,IFIRST(50)  ,     PRE00450
                #             IYD(250)     ,XD(250)                              PRE00460
                C-----------------------------------------------------------------CPRE00470
                C          DECLARATIONS FOR LOCAL VARIABLES.                       CPRE00480
                C-----------------------------------------------------------------CPRE00490
ISN 0010          REAL      NUH                                                    PRE00500
ISN 0011          DIMENSION INGAYS(50)    ,RMATRX(50,50)    ,RBIH(50)            PRE00510
ISN 0012          DIMENSION GVEC(250)     ,NUH(250)         ,UPUTN(250)          PRE00520
ISN 0013          DIMENSION XMATH1(250)                                            PRE00530
                C-----------------------------------------------------------------CPRE00540
                C    SETTING THE VALUES OF THE B MATRIX FROM THE H MATRIX FOUND IN  CPRE00550
                C   THE GROUPING PROCEDURE AND THE SAMPLING VARIANCE OF VDACES(I).  CPRE00560
                C-----------------------------------------------------------------CPRE00570
ISN 0014          DO 10 I = 1,NAS                                                  PRE00580
ISN 0015            BMATRX(I) = 0.0                                                PRE00590
ISN 0016            IF ( CLASS1(I) .NE. 1) GO TO 10                                PRE00600
ISN 0018            BMATRX(I) = VDACES(I) + HMATRX(I)                              PRE00610
ISN 0019        10 CONTINUE                                                        PRE00620
                C-----------------------------------------------------------------CPRE00630
                C       SETTING THE UNIQUE YIELD STRATA ID'S FROM THE VECTOR IDYSR  CPRE00640
                C    AND PLACING THEM INTO THE VECTOR IDYSEQ.                      CPRE00650
                C      ALSO COUNTING THE TOTAL NUMBER OF UNIQUE YIELD STRATA (NUMYS).CPRE00660
                C-----------------------------------------------------------------CPRE00670
ISN 0020          NUMYS      = 1                                                   PRE00680
ISN 0021          IYDSEQ(NUMYS) = IDYLSR(1)                                        PRE00690
ISN 0022          DO 20 I = 2,NAS                                                  PRE00700
ISN 0023            IF (IDYLSR(I).EQ.IYDSEQ(NUMYS)) GO TO 20                       PRE00710
ISN 0025            DO 18 J = 1,NUMYS                                              PRE00720
ISN 0026              IF (IDYLSR(I).EQ.IYDSEQ(J)) GO TO 20                         PRE00730
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ISN 0028            IF (IDYLSR(I).NE.IYDSEQ(J)) GO TO 19                                PRE00740
ISN 0030          18  CONTINUE                                                          PRE00750
ISN 0031          19  NUMYS = NUMYS + 1                                                 PRE00760
ISN 0032              IYDSEQ(NUMYS) = IDYLSR(I)                                       PRE00770
ISN 0033          20 CONTINUE                                                         PRE00780
                  C-------------------------------------------------------------------CPRE00790
                  C     ASSIGNING POINTER TO THE YIELD VARIANCE. THIS POINTER WILL     CPRE00800
                  C   INDICATE TO THE FIRST ACREAGE STRATA IN A YIELD STRATA. THIS     CPRE00810
                  C   POINTER WILL BE USED PRIMARILY FOR OBTAINING THE YIELD ESTIMATE  CPRE00820
                  C   AND YIELD VARIANCE FOR EACH YIELD STRATA IN THE ESTIMATION STEP. CPRE00830
                  C-------------------------------------------------------------------CPRE00840
ISN 0034            DO 30 I = 1,NUMYS                                                 PRE00850
ISN 0035              DO 29 J = 1,NAS                                                 PRE00860
ISN 0036                IF (IDYLSR(J).EQ.IYDSEQ(I)) IFIRST(I) = J                     PRE00870
ISN 0038                IF (IDYLSR(J).EQ.IYDSEQ(I)) GO TO 30                          PRE00880
ISN 0040          29    CONTINUE                                                      PRE00890
ISN 0041          30 CONTINUE                                                         PRE00900
                  C-------------------------------------------------------------------CPRE00910
                  C     ASSIGNING SEQUENTIAL NUMBERS (1,2,3,...NUMYS) TO THE YIELD    CPRE00920
                  C    STRATA CORRESPONDING TO THE ORDER IN WHICH WAS FOUND ABOVE IN THECPRE00930
                  C    IYSEQ VECTOR. THESE VALUES WILL BE USED PRIMARILY FOR CALCULATIONCPRE00940
                  C    OF THE R MATRIX IN THE ESTIMATION STEP.                        CPRE00950
                  C-------------------------------------------------------------------CPRE00960
ISN 0042            DO 40 I = 1,NUMYS                                                 PRE00970
ISN 0043              DO 39 J = 1,NAS                                                 PRE00980
ISN 0044                IF (IDYLSR(J).EQ.IYDSEQ(I)) IYD(J) = I                        PRE00990
ISN 0046          39    CONTINUE                                                      PRE01000
ISN 0047          40 CONTINUE                                                         PRE01010
                  C-------------------------------------------------------------------CPRE01020
                  C        THE FOLLOWING SECTION IS THE PERTINENT CALCULATION OF THE  CPRE01030
                  C    OPTIMAL WEIGHTING MATRIX OF XMATRX FOR THE MODEL :             CPRE01040
                  C                                                                   CPRE01050
                  C          PRODUCTION = YIELD * XMATRX * DIRECT_ACREAGE_ESTIMATES    CPRE01060
                  C                                                                   CPRE01070
                  C        THIS X MATRIX IS BUILT ACCORDING TO THE GROUPING OF ACREAGE CPRE01080
                  C    STRATA FOUND IN THE SUBROUTINUE GRPING.                        CPRE01090
                  C-------------------------------------------------------------------CPRE01100
ISN 0048            DO 50 I = 1,NAS                                                   PRE01110
ISN 0049              DO 50 J = 1,NAS                                                 PRE01120
ISN 0050          50    XMATRX(I,J) = 0.0                                             PRE01130
ISN 0051            DO 51 I = 1,NAS                                                   PRE01140
ISN 0052              DO 51 J = 1,NAS                                                 PRE01150
ISN 0053          51    RMATRX(I,J) = 0.0                                             PRE01160
                  C-------------------------------------------------------------------CPRE01170
                  C     -    START GROUP LOOP                                         CPRE01180
                  C-------------------------------------------------------------------CPRE01190
ISN 0054            IF (NGRPS.LE.0) STOP 60051                                        PRE01200
ISN 0056            DO 200 KGROUP = 1,NGRPS                                           PRE01210
                  C-------------------------------------------------------------------CPRE01220
                  C     -  FOR THE K_TH GROUP: COUNTING THE NUMBER OF ACREAGE STRATA  CPRE01230
                  C     -                BELONGING TO EACH YIELD STRATA.              CPRE01240
                  C-------------------------------------------------------------------CPRE01250
ISN 0057            DO 60 IYIELD = 1,NUMYS                                            PRE01260
ISN 0058              INGAYS(IYIELD) = 0                                              PRE01270
ISN 0059              DO 59 I = 1,NAS                                                 PRE01280
ISN 0060                IF (     GROUP(I)  .EQ. KGROUP                              PRE01290
                  *        .AND. IDYLSR(I) .EQ. IYDSEQ(IYIELD) )                     PRE01300
                  *                    INGAYS(IYIELD) = INGAYS(IYIELD) + 1          PRE01310
ISN 0062          59    CONTINUE                                                      PRE01320
ISN 0063          60    CONTINUE                                                      PRE01330
                  C-------------------------------------------------------------------CPRE01340
                  C     -  CALCULATION FOR THE R MATRIX :  INV(U'U) * INV(T) * NU_STAR CPRE01350
                  C-------------------------------------------------------------------CPRE01360
ISN 0064            DO 80 IYIELD = 1,NUMYS                                            PRE01370
ISN 0065              UPUTN(IYIELD) = 0.0                                             PRE01380
ISN 0066              IF (INGAYS(IYIELD).EQ.0) GO TO 80                               PRE01390
ISN 0068              I2 = IFIRST(IYIELD)                                             PRE01400
ISN 0069              IF (I2.GT.NAS) STOP 60080                                       PRE01410
ISN 0071              IF (INGAYS(IYIELD).EQ.0.0) STOP 60081                           PRE01420
ISN 0073              IF (VARESY(I2).EQ.0.0) STOP 60082                               PRE01430
ISN 0075              UPUTN(IYIELD) = YLDEST(I2) / INGAYS(IYIELD) / VARESY(I2)        PRE01440
ISN 0076          80  CONTINUE                                                        PRE01450
                  C-------------------------------------------------------------------CPRE01460
                  C     -    CALCULATION FOR THE R MATRIX :                          CPRE01470
                  C     -                  G = U * (INV(U'U)*INV(T)*NU_STAR)        CPRE01480
                  C-------------------------------------------------------------------CPRE01490
ISN 0077            DO 81 I = 1,NAS                                                   PRE01500
ISN 0078              GVEC(I) = 0.0                                                   PRE01510
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ISN 0079          81  CONTINUE                                                    PRE01520
ISN 0080              DO 82 IYIELD = 1,NUMYS                                      PRE01530
ISN 0081                IF (INGAYS(IYIELD).EQ.0) GO TO 82                         PRE01540
ISN 0083                DO 82 I = 1,NAS                                           PRE01550
ISN 0084                  IF (GROUP(I).NE.KGROUP)  GO TO 82                       PRE01560
ISN 0086                  IF (IYD(I).EQ.IYIELD) GVEC(I) = UPUTN(IYIELD)           PRE01570
ISN 0088          82  CONTINUE                                                    PRE01580
                  C  ------------------------------------------------------------CPRE01590
                  C  - CALCULATION FOR THE R MATRIX :  NU * W_MATRIX             CPRE01600
                  C  ------------------------------------------------------------CPRE01610
ISN 0089              DO 83 I = 1,NAS                                             PRE01620
ISN 0090                NUH(I) = 0.0                                              PRE01630
ISN 0091                IF (GROUP(I).NE.KGROUP .OR. CLASS1(I).EQ.0) GO TO 83      PRE01640
ISN 0093                IF (CLASS1(I).EQ.1) NUH(I) = YLDEST(I) * HMATRX(I)        PRE01650
ISN 0095          83  CONTINUE                                                    PRE01660
                  C  ------------------------------------------------------------CPRE01670
                  C  - CALCULATION FOR THE R MATRIX :                            CPRE01680
                  C  -   (1 + NU' * G) = (1 + SUM(NU_STAR_I / T_STAR))           CPRE01690
                  C  ------------------------------------------------------------CPRE01700
ISN 0096              ONEPNG = 1.0                                                PRE01710
ISN 0097              DO 84 IYIELD = 1,NUMYS                                      PRE01720
ISN 0098                IF (INGAYS(IYIELD).EQ.0) GO TO 84                         PRE01730
ISN 0100                I2 = IFIRST(IYIELD)                                       PRE01740
ISN 0101                IF (I2.GT.NAS) STOP 60084                                 PRE01750
ISN 0103                IF (VARESY(I2).EQ.0.0) STOP 60085                         PRE01760
ISN 0105                ONEPNG = ONEPNG + YLDEST(I2) **2 / VARESY(I2)             PRE01770
ISN 0106          84  CONTINUE                                                    PRE01780
                  C  ------------------------------------------------------------CPRE01790
                  C  -  FINAL CALCULATION OF THE R MATRIX :                      CPRE01800
                  C  -       R = INV(1 + NU'*G)   *  G   *  (NU'*W_MATRIX)      CPRE01810
                  C  ------------------------------------------------------------CPRE01820
ISN 0107              DO 86 I = 1,NAS                                             PRE01830
ISN 0108                IF (GROUP(I).NE.KGROUP) GO TO 86                          PRE01840
ISN 0110                DO 86 J = 1,NAS                                           PRE01850
ISN 0111                  IF (GROUP(J).NE.KGROUP .OR. CLASS1(J).EQ.0) GO TO 86    PRE01860
ISN 0113                  IF (ONEPNG.EQ.0.0) STOP 60086                           PRE01870
ISN 0115                  RMATRX(I,J) = GVEC(I) * NUH(J) / ONEPNG                 PRE01880
ISN 0116          86  CONTINUE                                                    PRE01890
                  C  ------------------------------------------------------------CPRE01900
                  C  -                                                           CPRE01910
                  C  -  CALCULATION OF THE VECTOR RBH WHICH IS :                 CPRE01920
                  C  -          RBH = RMATRX * INV(BMATRX) * H                   CPRE01930
                  C  -     WHERE H IS THE VECTOR OF RATIO HISTORICAL ACREAGE.    CPRE01940
                  C  ------------------------------------------------------------CPRE01950
ISN 0117              DO 90 I = 1,NAS                                             PRE01960
ISN 0118                RBIH(I) = 0.0                                             PRE01970
ISN 0119                DO 90 J = 1,NAS                                           PRE01980
ISN 0120                  IF (GROUP(J).NE.KGROUP .OR. CLASS1(J).EQ.0)  GO TO 90   PRE01990
ISN 0122                  IF (BMATRX(J).EQ.0) STOP 60090                          PRE02000
ISN 0124                  RBIH(I) = RBIH(I) + RMATRX(I,J) * HRATYR(J) / BMATRX(J) PRE02010
ISN 0125          90  CONTINUE                                                    PRE02020
                  C  ------------------------------------------------------------CPRE02030
                  C  -                                                           CPRE02040
                  C  -  CALCULATION OF HBH = H' * INV(BMATRX) * H                CPRE02050
                  C  ------------------------------------------------------------CPRE02060
ISN 0126              HBH = 0.0                                                   PRE02070
ISN 0127              DO 100 I = 1,NAS                                            PRE02080
ISN 0128                IF (GROUP(I).NE.KGROUP .OR. CLASS1(I).EQ.0)  GO TO 100    PRE02090
ISN 0130                IF (BMATRX(I).EQ.0) STOP 60100                            PRE02100
ISN 0132                HBH = HBH + HRATYR(I)**2 / BMATRX(I)                      PRE02110
ISN 0133         100  CONTINUE                                                    PRE02120
                  C  ------------------------------------------------------------CPRE02130
                  C  -                                                           CPRE02140
                  C  -  *** FINAL ***   CALCULATION OF THE X MATRIX USING THE    CPRE02150
                  C  -  ABOVE CALCULATIONS.                                      CPRE02160
                  C  -                                                           CPRE02170
                  C  -  XMATRX = ( (H-RBH) * H / HBH  + RMATRX )  * INV(BMATRX)  CPRE02180
                  C  ------------------------------------------------------------CPRE02190
ISN 0134              DO 110 I = 1,NAS                                            PRE02200
ISN 0135                IF (GROUP(I).NE.KGROUP) GO TO 110                         PRE02210
ISN 0137                DO 110 J = 1,NAS                                          PRE02220
ISN 0138                  IF (GROUP(J).NE.KGROUP .OR. CLASS1(J).EQ.0) GO TO 110   PRE02230
ISN 0140                    IF (HBH.EQ.0)       STOP 60110                      PRE02240
ISN 0142                    IF (BMATRX(J).EQ.0) STOP 60111                      PRE02250
ISN 0144                    XMATRX(I,J) = (  ((HRATYR(I)-RBIH(I)) * HRATYR(J)) / HBH  PRE02260
                  *                        + RMATRX(I,J) )                      PRE02270
                  *                                        / BMATRX(J)          PRE02280
ISN 0145         110  CONTINUE                                                    PRE02290
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                C     ------------------------------------------------------------CPRE02300
                CC    -  SETTING HBH FOR THIS GROUP FOR THE ESTIMATION ROUTINUE.   CPRE02310
                C     ------------------------------------------------------------CPRE02320
ISN 0146              XOC1(KGROUP) = HBH                                           PRE02330
                C     ------------------------------------------------------------CPRE02340
                CC    -  CALCUALTION OF THE GAMMA ASSOCIATED WITH THIS K_TH GROUP. CPRE02350
                C     ------------------------------------------------------------CPRE02360
ISN 0147              TOP = 0.0                                                    PRE02370
ISN 0148              BOT = 0.0                                                    PRE02380
ISN 0149              DO 120 I = 1,NAS                                             PRE02390
ISN 0150                IF (GROUP(I).NE.KGROUP .OR. CLASS1(I).EQ.0) GO TO 120      PRE02400
ISN 0152                TOP = TOP + DACES(I)                                       PRE02410
ISN 0153                BOT = BOT + HRATYR(I)                                      PRE02420
ISN 0154      120     CONTINUE                                                     PRE02430
ISN 0155              IF (BOT.EQ.0)  STOP 60120                                    PRE02440
ISN 0157              GRPGAM = (TOP / BOT) ** (1.0/GAP)                            PRE02450
                C     ------------------------------------------------------------CPRE02460
                CC    -  ASSIGNEMENT OF THIS K TH GROUP GAMMA TO EACH OF THE       CPRE02470
                CC    -  STRATA BELONGING TO THIS K_TH GROUP.                      CPRE02480
                C     ------------------------------------------------------------CPRE02490
ISN 0158              DO 130 I = 1,NAS                                             PRE02500
ISN 0159                IF (GROUP(I) .EQ. KGROUP) GAMMA(I) = GRPGAM                PRE02510
ISN 0161      130     CONTINUE                                                     PRE02520
ISN 0162      200 CONTINUE                                                         PRE02530
                C     ------------------------------------------------------------CPRE02540
                CC    C A L C U L A T I O N  OF THE ADJUSTED ACREAGE VALUES   :    CPRE02550
                CC                  X_MATRIX * DIRECT_ESTIMATES                  CPRE02560
                C     ------------------------------------------------------------CPRE02570
ISN 0163            DO 210 I = 1,NAS                                               PRE02580
ISN 0164              XD(I) = 0.0                                                  PRE02590
ISN 0165              DO 209 J = 1,NAS                                             PRE02600
ISN 0166                IF (CLASS1(J).EQ.1) XD(I) = XD(I) + XMATRX(I,J) * DACES(J) PRE02610
ISN 0168      209     CONTINUE                                                     PRE02620
ISN 0169      210 CONTINUE                                                         PRE02630
                C     ------------------------------------------------------------CPRE02640
                CC    C H E C K I N G   THE XMATRIX FOR THE CONDITION OF   :      CPRE02650
                CC                    X_MATRIX * HISTORICAL_1 = HISTORICAL       CPRE02660
                C     ------------------------------------------------------------CPRE02670
ISN 0170            DO 220 I = 1,NAS                                               PRE02680
ISN 0171              XMATH1(I) = 0.0                                              PRE02690
ISN 0172              DO 220 J = 1,NAS                                             PRE02700
ISN 0173                XMATH1(I) = XMATH1(I) + XMATRX(I,J) * HRATYR(J)            PRE02710
ISN 0174      220 CONTINUE                                                         PRE02720
ISN 0175            DO 230 I = 1,NAS                                               PRE02730
ISN 0176              IF (HRATYR(I).EQ.0.0) STOP 60230                             PRE02740
ISN 0178              CHECK = (XMATH1(I) - HRATYR(I)) / HRATYR(I)                  PRE02750
ISN 0179              IF (ABS(CHECK).GT.1.0E-2) WRITE(6,9230) I,XMATH1(I),HRATYR(I) PRE02760
ISN 0181      230 CONTINUE                                                         PRE02770
ISN 0182     9230 FORMAT(3X,'E R R O R :  THE',I3,'_TH ELEMENT OF X_MATRIX * HISTORIPRE02780
                #CAL_1 != HISTORICAL.',4X,F15.5,2X,'!=',F15.5)                    PRE02790
                C     ------------------------------------------------------------CPRE02800
ISN 0183            IF (IOUT.NE.4 .AND. IOUT.NE.5 .AND. IOUT.NE.6) GO TO 500     PRE02810
ISN 0185            WRITE(6,9239)                                                PRE02820
ISN 0186            DO 240 I = 1,NAS                                             PRE02830
ISN 0187              WRITE(6,9240) IDSR(I),DACES(I),HRATYR(I),                  PRE02840
                    #                GROUP(I),GAMMA(I),HMATRX(I)                 PRE02850
ISN 0188      240 CONTINUE                                                         PRE02860
ISN 0189            WRITE(6,9250)                                                PRE02870
ISN 0190            J2 = 0                                                       PRE02880
ISN 0191            DO 250 IPAGE = 1,17                                          PRE02890
ISN 0192              J1 = J2 + 1                                                PRE02900
ISN 0193              J2 = J1 + 15                                               PRE02910
ISN 0194              IF (J2.GT.NAS) J2 = NAS                                    PRE02920
ISN 0196              IF (J1.GT.NAS) GO TO 251                                   PRE02930
ISN 0198              DO 249 I = 1,NAS                                           PRE02940
ISN 0199                WRITE(6,9249) (XMATRX(I,J), J = J1,J2)                   PRE02950
ISN 0200      249     CONTINUE                                                     PRE02960
ISN 0201      250 CONTINUE                                                         PRE02970
ISN 0202      251 CONTINUE                                                         PRE02980
ISN 0203     9250 FORMAT(//,53X,'X OPTIMAL WEIGHTING MATRIX',/)                    PRE02990
ISN 0204     9249 FORMAT(14F9.5)                                                   PRE03000
ISN 0205     9239 FORMAT(//,20X,'DIRECT',/,10X,'AREA',6X,'AREA',5X,'HISTORICAL',/, PRE03010
                # 9X,'STRATA',3X,'ESTIMATE',6X,'AREA',5X,'GROUP',4X,'GAMMA',6X,'H MPRE03020
                #ATRIX',//)                                                       PRE03030
ISN 0206     9240 FORMAT(9X,I5,2X,F9.2,3X,F9.2,4X,I2,3X,F10.6,2X,F11.3)            PRE03040
ISN 0207      500 RETURN                                                         PRE03050
ISN 0208          END                                                            PRE03060
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*****FORTRAN CROSS REFERENCE LISTING*****

SYMBOL	INTERNAL STATEMENT NUMBERS
I	0014 0015 0016 0018 0018 0018 0022 0023 0026 0028 0032 0034 0036 0036 0038 0042 0044 0044 0048
	0050 0051 0053 0059 0060 0060 0077 0078 0083 0084 0086 0086 0089 0090 0091 0091 0093 0093 0093
	0093 0107 0108 0115 0115 0117 0118 0124 0124 0124 0127 0128 0128 0130 0132 0132 0134 0135 0144
	0144 0144 0144 0149 0150 0150 0152 0153 0158 0159 0159 0163 0164 0166 0166 0166 0170 0171 0173
	0173 0173 0175 0176 0178 0178 0178 0179 0179 0179 0186 0187 0187 0187 0187 0187 0198 0199
J	0025 0026 0028 0035 0036 0036 0038 0043 0044 0044 0049 0050 0052 0053 0110 0111 0111 0115 0115
	0119 0120 0120 0122 0124 0124 0124 0137 0138 0138 0142 0144 0144 0144 0144 0165 0166 0166 0166
	0172 0173 0173 0199 0199 0199
I2	0068 0069 0073 0075 0075 0100 0101 0103 0105 0105
J1	0192 0193 0196 0199
J2	0190 0192 0193 0194 0194 0199
XD	0009 0164 0166 0166
ABS	0179
BOT	0148 0153 0153 0155 0157
GAP	0003 0005 0157
HBH	0126 0132 0132 0140 0144 0146
IYD	0009 0044 0086
NAS	0005 0014 0022 0035 0043 0048 0049 0051 0052 0059 0069 0077 0083 0089 0101 0107 0110 0117 0119
	0127 0134 0137 0149 0158 0163 0165 0170 0172 0175 0186 0194 0194 0196 0198
NUH	0010 0012 0090 0093 0115
TOP	0147 0152 0152 0157
GVEC	0012 0078 0086 0115
IDSR	0007 0187
IOUT	0005 0183 0183 0183
JOIN	0004 0005
NARB	0005
RBIH	0011 0118 0124 0124 0144
XOC1	0009 0146
CHECK	0178 0179
DACES	0007 0152 0166 0187
GAMMA	0009 0159 0187
GROUP	0008 0009 0080 0084 0091 0108 0111 0120 0128 0135 0138 0150 0159 0187
ICROP	0005
IPAGE	0191
NGRPS	0009 0054 0056
NUMYS	0009 0020 0021 0023 0025 0031 0031 0032 0034 0042 0057 0064 0080 0097
PREST	0002
TAREA	0007
UPUTN	0012 0065 0075 0086
VARTY	0007
ARBSET	0004 0005
BMATRX	0009 0015 0018 0122 0124 0130 0132 0142 0144
CLASS1	0006 0007 0016 0091 0093 0111 0120 0128 0138 0150 0166
GRPGAM	0157 0159
HMATRX	0009 0018 0093 0187
HRATYR	0007 0124 0132 0144 0144 0153 0173 0176 0178 0178 0179 0187
HSACRE	0007
IDYLSR	0007 0021 0023 0026 0028 0032 0036 0038 0044 0060
IFIRST	0009 0036 0068 0100
INGAYS	0011 0058 0060 0060 0066 0071 0075 0081 0098
ISCALE	0005
IUNITS	0005
IYDSEQ	0009 0021 0023 0026 0028 0032 0036 0038 0044 0060
IYIELD	0057 0058 0060 0060 0064 0065 0066 0068 0071 0075 0075 0080 0081 0086 0086 0097 0098 0100
KGROUP	0056 0060 0084 0091 0108 0111 0120 0128 0135 0138 0146 0150 0159
NHSYRS	0005
NYRSIN	0005
ONEPNG	0096 0105 0105 0113 0115
RATOYR	0003 0005
RMATRX	0011 0053 0115 0124 0144
VARESY	0007 0073 0075 0103 0105
VDACES	0007 0018
XHATH1	0013 0171 0173 0173 0178 0179
XHATRX	0009 0050 0144 0166 0173 0199
YLDEST	0007 0075 0093 0105

*****FORTRAN CROSS REFERENCE LISTING*****

LABEL	DEFINED	REFERENCES
10	0019	0014 0016
18	0030	0025
19	0031	0028
20	0033	0022 0023 0026
29	0040	0035
30	0041	0034 0038
39	0046	0043

*****FORTRAN CROSS REFERENCE LISTING*****

LABEL	DEFINED	REFERENCES			
40	0047	0042			
50	0050	0048	0049		
51	0053	0051	0052		
59	0062	0059			
60	0063	0057			
80	0076	0064	0066		
81	0079	0077			
82	0088	0080	0081	0083	0084
83	0095	0089	0091		
84	0106	0097	0098		
86	0116	0107	0108	0110	0111
90	0125	0117	0119	0120	
100	0133	0127	0128		
110	0145	0134	0135	0137	0138
120	0154	0149	0150		
130	0161	0158			
200	0162	0056			
209	0168	0165			
210	0169	0163			
220	0174	0170	0172		
230	0181	0175			
240	0188	0186			
249	0200	0198			
250	0201	0191			
251	0202	0196			
500	0207	0183			
9230	0182	0179			
9239	0205	0185			
9240	0206	0187			
9249	0204	0199			
9250	0203	0189			

/ PREST / SIZE OF PROGRAM 0047A2 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	0001EC	J	SF	I*4	0001F0	J2	SF	I*4	0001F4	J1	SF	I*4	0001F8
J2	SF	I*4	0001FC	XD	SF C	R*4	03E998	BOT	SF	R*4	000200	GAP	F C	I*4	000010
HRH	SF	R*4	000204	IYD	S C	I*4	03E5B0	NAS	F C	I*4	000000	NUH	SF	R*4	000228
TOP	SF	R*4	000208	GVEC	SF	R*4	000610	IDSR	F C	I*4	000000	IOUT	C	I*4	0211F4
JOIN	C	I*2	NR	NARB	C	I*4	NR	RBIH	SF	R*4	0009F8	XOCI	S C	R*4	03E034
CHECK	S A	R*4	00020C	DACES	F C	R*4	000BB8	GAMMA	SF C	R*4	000BBC	GROUP	F C	I*4	000004
ICROP	C	I*4	NR	IPAGE	SF	I*4	000210	NGRPS	F C	I*4	000000	NUMYS	SF C	I*4	03E41C
PREST		R*4	000214	TAREA	C	R*4	NR	UPUTN	SF	R*4	000AC0	VARTY	C	R*4	NR
FRXPRN	XF	R*4	000000	ARBSET	C	I*2	NR	BMATRX	SF C	R*4	0007D4	CLASS1	C	I*4	0007D0
GRPGAM	SF	R*4	000218	HMATRX	F C	R*4	0003EC	HRATYR	F C	R*4	004A38	HSACRE	C	R*4	NR
IBCOMN	XF	I*4	000000	IDYLSR	F C	I*4	0003E8	IFIRST	SF C	I*4	03E4E8	INGAYS	SF	I*4	000EA8
ISCALE	C	I*4	NR	IUNITS	C	I*4	NR	IYDSEQ	S C	I*4	03E420	IYIELD	SF	I*4	00021C
KGROUP	SF	I*4	000220	NHSYRS	C	I*4	NR	NYRS1H	C	I*4	NR	ONEPNG	SF	R*4	000224
RATOYR	C	I*4	NR	RMATRX	SF	R*4	000F70	VARESY	F C	R*4	001F40	VDACES	F C	R*4	000FA0
XMATH1	SF	R*4	003684	XMATRX	SF C	R*4	000FA4	YLDEST	F C	R*4	001770				

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * PARAM* SIZE OF BLOCK 0211F8 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NAS	I*4	000000	NHSYRS	I*4	000004 NR	NYRS1H	I*4	000008 NR	RATOYR	I*4	00000C NR
GAP	I*4	000010	ISCALE	I*4	000014 NR	IUNITS	I*4	000018 NR	ICROP	I*4	000158 NR
JOIN	I*2	000298 NR	NARB	I*4	01EAE0 NR	ARBSET	I*2	01EAE4 NR	IOUT	I*4	0211F4

NAME OF COMMON BLOCK * DATA* SIZE OF BLOCK 004E20 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
IDSR	I*4	000000	IDYLSR	I*4	0003E8	CLASS1	I*4	0007D0	DACES	R*4	000BB8
VDACES	R*4	000FA0	TAREA	R*4	001388 NR	YLDEST	R*4	001770	VARTY	R*4	001B58 NR
VARESY	R*4	001F40	HSACRE	R*4	00232A NR	HRATYR	R*4	004A38			

NAME OF COMMON BLOCK * EST* SIZE OF BLOCK 03EDA0 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NGRPS	I*4	000000	GROUP	I*4	000004	HMATRX	R*4	0003EC	BMATRX	R*4	0007D4

GAMMA	R*4	000B8C	XMATRX	R*4	000FA4	XOC1	R*4	03E034	NUMYS	I*4	03E41C
IYDSEQ	I*4	03E420	IFIRST	I*4	03E4E8	IYD	I*4	03E5B0	XD	R*4	03E998

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
10	19	003B14	18	30	003BA0	19	31	003BAA	20	33	003BCC
29	40	003C2A	30	41	003C32	39	46	003C76	40	47	003C7E
50	50	003C96	51	53	003CCC	59	62	003D7E	60	63	003D8E
80	76	003E84	81	79	003EAA	82	88	003F14	83	95	003FB0
84	106	00404C	86	116	0040E4	90	125	00419C	100	133	004230
110	145	004312	120	154	0043A4	130	161	00442C	200	162	00443C
209	168	0044B2	219	169	0044BA	220	174	004528	230	181	0045E8
240	188	0046BC	249	200	004756	250	201	004766	251	202	004778
500	207	004778									

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	003AAC	100002	15	003AC8	100003	18	003AEC	100004	20	003B24
100005	23	003B42	100006	25	003B62	100007	26	003B64	100008	28	003B82
100010	34	003BDC	100011	35	003BE0	100012	36	003BE2	100013	37	003C00
100014	38	003C0C	100016	42	003C44	100017	43	003C48	100018	44	003C4A
100019	45	003C68	100021	48	003C90	100022	49	003C94	100023	51	003CB6
100024	51	003CC6	100025	52	003CCA	100026	54	003CEC	100027	54	003CFC
100028	55	003D06	100029	56	003D14	100030	57	003D18	100031	58	003D1C
100032	60	003D30	200001	61	003D44	100033	61	003D64	100035	64	003DA0
100036	65	003DA4	100037	68	003DC6	100038	70	003DDC	100039	71	003DEA
100040	72	003E0C	100041	73	003E1A	100042	74	003E30	100043	75	003E3E
100044	77	003E96	100045	78	003E9A	100046	80	003EBA	100047	81	003EBE
100048	83	003ED0	100049	84	003ED4	100050	86	003EE8	100051	87	003EFC
100052	89	003F24	100053	89	003F36	100054	90	003F3A	200002	92	003F5E
100055	93	003F74	100056	94	003F88	100057	96	003FC0	100058	98	003FCC
100059	100	003FDE	100060	102	003FF4	100061	103	004002	100062	104	004018
100063	105	004026	100064	107	00405E	100065	108	004062	100066	110	004076
100067	111	004078	200003	112	00408A	100068	113	00409E	100069	114	0040A8
100070	115	0040B6	100071	117	0040EC	100072	117	0040FC	100073	118	004100
100074	120	004112	200004	121	004124	100075	122	004138	100076	123	004148
100077	124	004156	100078	126	0041A4	100079	126	004184	100080	128	0041C0
200005	129	0041D4	100081	130	0041EA	100082	131	0041FC	100083	132	00420A
100084	134	004240	100085	135	004244	100086	137	004258	100087	138	00425A
200006	139	00426C	100088	140	004280	100089	141	00428A	100090	142	004298
100091	143	0042A8	100092	144	0042B6	100093	146	00431A	100094	146	00432A
100095	150	00434A	200007	151	00435E	100096	152	004374	100097	155	0043B4
100098	156	0043BE	100099	157	0043CC	100100	159	00440R	100101	160	00441C
100103	163	004446	100104	164	004452	100105	166	004464	100106	167	004476
100108	170	0044CA	100109	171	0044CE	100110	173	0044E4	100111	175	004530
100112	175	004540	100113	176	004544	100114	177	00455A	100115	178	004568
100116	180	0045A2	100117	182	0045F8	200008	184	004608	200009	184	004618
100118	185	004628	100119	187	004640	100120	189	0046CC	100121	192	0046EC
100122	195	004704	100123	196	004708	100124	198	004710	100125	199	004714

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
9230	182	000028	9250	203	000085	9249	204	0000AB	9239	205	0000AF
9240	206	00011B									

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 207, PROGRAM SIZE = 18338, SUBPROGRAM NAME = PREST

STATISTICS NO DIAGNOSTICS GENERATED

***** END OF COMPILATION ***** 181K BYTES OF CORE NOT USED

REQUESTED OPTIONS:

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

```
ISN 0002          SUBROUTINE RDATA(NHSYRS, NORECS)                                  RDA00010
C-------------------------------------------------------------------------------CRDA00020
CCCCCCCCCCCCCCCCC                                                                 CRDA00030
CCCCCCCCCCCCCCCCC S U B R O U T I N E                                             CRDA00040
CCCCCCCCCCCCCCCCC    RDATA                                                        CRDA00050
CCCCCCCCCCCCCCCCC                                                                 CRDA00060
CCCCCCCCCCCCCCCCC H I S T O R Y                                                   CRDA00070
CCCCCCCCCCCCCCCCC                                                                 CRDA00080
CCCCCCCCCCCCCCCCC    PROGRAMMER..... PATRICK BROWN, LEMSCO, 5/11/81               CRDA00090
CCCCCCCCCCCCCCCCC                                                                 CRDA00100
CCCCCCCCCCCCCCCCC P U R P O S E                                                   CRDA00110
CCCCCCCCCCCCCCCCC                                                                 CRDA00120
CCCCCCCCCCCCCCCCC 1)  READ THE DATA FILE.                                         CRDA00130
CCCCCCCCCCCCCCCCC                                                                 CRDA00140
CCCCCCCCCCCCCCCCC 2)  SET THE VECTOR CLASS1(I) = 1 IF THE I-TH ACREAGE STRATUM HAS CRDA00150
CCCCCCCCCCCCCCCCC     CLASS 1 DATA, 0 OTHERWISE.                                  CRDA00160
CCCCCCCCCCCCCCCCC                                                                 CRDA00170
CCCCCCCCCCCCCCCCC SUBROUTINES REQUIRED                                            CRDA00180
CCCCCCCCCCCCCCCCC                                                                 CRDA00190
CCCCCCCCCCCCCCCCC ZSORT                                                           CRDA00200
CCCCCCCCCCCCCCCCC                                                                 CRDA00210
CCCCCCCCCCCCCCCCC R E M A R K S                                                   CRDA00220
CCCCCCCCCCCCCCCCC                                                                 CRDA00230
CCCCCCCCCCCCCCCCC FOR EACH ACREAGE STRATUM, READ THE FOLLOWING:                   CRDA00240
CCCCCCCCCCCCCCCCC                                                                 CRDA00250
CCCCCCCCCCCCCCCCC   VARIABLE          DESCRIPTION                                 CRDA00260
CCCCCCCCCCCCCCCCC   --------          -----------                                 CRDA00270
CCCCCCCCCCCCCCCCC   IDSR              ID OF THE ACREAGE STRATUM                   CRDA00280
CCCCCCCCCCCCCCCCC   IDYLSR            ID OF THE YIELD STRATUM                     CRDA00290
CCCCCCCCCCCCCCCCC   DACES             DIRECT ACREAGE ESTIMATE                     CRDA00300
CCCCCCCCCCCCCCCCC   VDACES            VARIANCE OF DACES                           CRDA00310
CCCCCCCCCCCCCCCCC   TAREA             TOTAL AREA OF ACREAGE STRATUM               CRDA00320
CCCCCCCCCCCCCCCCC   YLDEST            YIELD ESTIMATE                              CRDA00330
CCCCCCCCCCCCCCCCC   VARTY             VARIANCE OF THE TRUE YIELD                  CRDA00340
CCCCCCCCCCCCCCCCC   VARESY            VARIANCE OF THE ESTIMATED YIELD             CRDA00350
CCCCCCCCCCCCCCCCC   HSACRE            HISTORICAL ACREAGE FOR NHSYRS, THE NUMBER   CRDA00360
CCCCCCCCCCCCCCCCC                     OF HISTORICAL YEARS (10 YEARS MAXIMUM).     CRDA00370
C-------------------------------------------------------------------------------CRDA00380
ISN 0003          INTEGER  CLASS1                                                 RDA00390
ISN 0004          COMMON /DATA/ IDSR(250)      ,IDYLSR(250)                ,      RDA00400
                 #              CLASS1(250)     ,                                 RDA00410
                 #              DACES(250)      ,VDACES(250)  ,TAREA(250)   ,     RDA00420
                 #              YLDEST(250)     ,VARTY(250)   ,VARESY(250)  ,     RDA00430
                 #              HSACRE(250,10)  ,HRATYR(250)                      RDA00440
C                                                                               CRDA00450
C---------------------- SUBROUTINE BEGINS ------------------------------------CRDA00460
C                                                                               CRDA00470
ISN 0005          IF (NHSYRS .LT. 1) STOP 10010                                   RDA00480
ISN 0007          IF (NHSYRS .GT. 10) STOP 10011                                  RDA00490
ISN 0009          DO 10  I = 1, 250                                               RDA00500
ISN 0010             READ(5,900, END = 15) IDSR(I), IDYLSR(I), DACES(I), VDACES(I),RDA00510
                 1         TAREA(I),YLDEST(I),VARTY(I),VARESY(I),                RDA00520
                 2         (HSACRE(I,J), J = 1, NHSYRS)                          RDA00530
ISN 0011     900     FORMAT(I5, 2X, I3, 1X, F9.2, 2X, F9.1, 2X, F9.3, 1X, F8.3, 1X,RDA00540
                 1         2F7.2, 1X, 10(F9.3) )                                 RDA00550
ISN 0012             CLASS1(I) = 1                                               RDA00560
ISN 0013             IF (DACES(I) .EQ. -1.0) CLASS1(I) = 0                       RDA00570
ISN 0015             IF (VARTY(I).LE.0.0)  VARTY(I)  = 1.0E-70                   RDA00580
ISN 0017             IF (VARESY(I).EQ.0.0) VARESY(I) = 1.0E-70                   RDA00590
ISN 0019             NORECS = I                                                  RDA00600
ISN 0020      10     CONTINUE                                                    RDA00610
ISN 0021      15     IF (NORECS .LE. 0) STOP 10015                               RDA00620
```

```
                C
                C   SORT DATA
                C
   ISN 0023         CALL ZSORT(NORECS,NHSYRS)                          RDA00740
   ISN 0024         RETURN                                             RDA00750
   ISN 0025         END                                                RDA00760
                                                                       RDA00770
                                                                       RDA00780
                                                                       RDA00790
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS																
I	0009	0010	0010	0010	0010	0010	0010	0010	0010	0010	0012	0013	0013	0015	0015	0017	0017	0019
J	0010	0010	0010															
IDSR	0004	0010																
DACES	0004	0010	0013															
RDATA	0002																	
TAREA	0004	0010																
VARTY	0004	0010	0015	0015														
ZSORT	0023																	
CLASS1	0003	0004	0012	0013														
HRATYR	0004																	
HSACRE	0004	0010																
IDYLSR	0004	0010																
NHSYRS	0002	0005	0007	0010	0023													
NORECS	0002	0019	0021	0023														
VARESY	0004	0010	0017	0017														
VDACES	0004	0010																
YLDEST	0004	0010																

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES
10	0020	0009
15	0021	0010
900	0011	0010

/ RDATA / SIZE OF PROGRAM 0002E6 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	0000D8	J	F	I*4	0000DC	IDSR	S C	I*4	000000	DACES	S C	R*4	000888
RDATA		R*4	0000E0	TAREA	S C	R*4	001388	VARTY	S C	R*4	001858	ZSORT	SF XF		000000
CLASS1	S C	I*4	0007D0	HRATYR	C	R*4	NR	HSACRE	S C	R*4	002328	IBCOM#	XF	I*4	000000
IDYLSR	S C	I*4	0003E8	NHSYRS	SFA	I*4	0000E4	NORECS	SFA	I*4	0000E8	VARESY	S C	R*4	001F40
VDACES	S C	R*4	000FA0	YLDEST	S C	R*4	001770								

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * DATA* SIZE OF BLOCK 004E20 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
IDSR	I*4	000000	IDYLSR	I*4	0003E8	CLASS1	I*4	0007D0	DACES	R*4	000888
VDACES	R*4	000FA0	TAREA	R*4	001388	YLDEST	R*4	001770	VARTY	R*4	001858
VARESY	R*4	001F40	HSACRE	R*4	002328	HRATYR	R*4	004A38 NR			

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
10	20	000268	15	21	000270						

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	000108	100002	6	00012C	100003	7	00013A	100004	8	000142
100005	9	000150	100006	10	000152	100007	10	000168	100010	14	00021E
100011	15	000228	100012	16	000238	100013	17	000246	100014	18	000256
100015	19	000264	100017	22	00027A	100018	23	0002AA			

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
900	11	00002B									

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

```
*LEVEL 2.3.0 (JUNE 78)          RDATA          OS/360  FORTRAN H EXTENDED          DATE 82.014/11.28.04          PAGE   3
*STATISTICS*      SOURCE STATEMENTS =       24, PROGRAM SIZE =       742, SUBPROGRAM NAME = RDATA
*STATISTICS*  NO  DIAGNOSTICS GENERATED
****** END OF COMPILATION ******                                  225K BYTES OF CORE NOT USED
```

REQUESTED OPTIONS:

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

```
ISN 0002          SUBROUTINE READFL(IERROR)                                      REA00010
                C-------------------------------------------------------------------CREA00020
                C                                                                   CREA00030
                C  S U B R O U T I N E                                              CREA00040
                C  -------------------                                              CREA00050
                C      READFL                                                       CREA00060
                C                                                                   CREA00070
                C  H I S T O R Y                                                    CREA00080
                C  -------------                                                    CREA00090
                C      PROGRAMMER ..... PATRICK BROWN ,LEMSCO ,5/15/81              CREA00100
                C                                                                   CREA00110
                C  P U R P O S E                                                    CREA00120
                C  -------------                                                    CREA00130
                C                                                                   CREA00140
                C    1)  READ THE CONTROL CARD FILE                                 CREA00150
                C                                                                   CREA00160
                C    2)  CALL RDATA TO READ THE DATA FILE.                          CREA00170
                C                                                                   CREA00180
                C    3)  SET THE JOIN(I,J) AND ARBSET(I,J) MATRICES                 CREA00190
                C                                                                   CREA00200
                C    4)  SET THE HISTORICAL ACREAGE VECTOR HRATY(I) FOR THE         CREA00210
                C        RATIO YEAR.                                                CREA00220
                C                                                                   CREA00230
                C  SUBROUTINES REQUIRED                                             CREA00240
                C  --------------------                                             CREA00250
                C                                                                   CREA00260
                C  RDATA              READ THE DATA FILE.                           CREA00270
                C  NUMBR              FUNCTION TO OBTAIN THE NUMBERS ON A CONTROL   CREA00280
                C                     CARD LINE.                                    CREA00290
                C                                                                   CREA00300
                C  R E M A R K S                                                    CREA00310
                C  -------------                                                    CREA00320
                C                                                                   CREA00330
                C  THE PARAMETER IERROR WILL BE SET TO A NONZERO NUMBER IF:         CREA00340
                C                                                                   CREA00350
                C    1)  THERE IS AN UNIDENTIFIED KEY WORD IN COLUMNS 1-4 OF THE    CREA00360
                C        CONTROL CARD FILE.                                         CREA00370
                C                                                                   CREA00380
                C    2)  THERE IS AN UNIDENTIFIED STRATUM NUMBER IN A JOIN          CREA00390
                C        STATEMENT OF THE CONTROL CARD FILE.                        CREA00400
                C                                                                   CREA00410
                C    3)  THERE IS AN UNIDENTIFIED STRATUM NUMBER IN A PZONE         CREA00420
                C        STATEMENT OF THE CONTROL CARD FILE                         CREA00430
                C                                                                   CREA00440
                C-------------------------------------------------------------------CREA00450
ISN 0003          DIMENSION LINE(80), NUMBER(250), NAMES(15), IJOIN(13)            REA00460
                C                                                                   REA00470
                C  NAMES HAS DIMENSION 15 BECAUSE OF 15 DATA NAMES (KEYWORDS) IN    REA00480
                C  THE DATA STATEMENT BELOW.  NUMBER HAS DIMENSION 250 BECAUSE      REA00490
                C  AN ARBITRARY SET MAY REFER TO ANY OF THE POSSIBLE 250 ACREAGE STRATA.REA00500
                C                                                                   REA00510
ISN 0004          INTEGER  RATOYR ,GAP                                             REA00520
ISN 0005          INTEGER*2  JOIN, ARBSET                                          REA00530
ISN 0006          COMMON /PARAM/NAS            ,NHSYRS      ,NYRSIH      ,       REA00540
                  #            RATOYR          ,GAP                      ,       REA00550
                  #            ISCALE          ,IUNITS(80)  ,ICROP(80)    ,       REA00560
                  #            JOIN(250,250)   ,NARB        ,ARBSET(20,250),     REA00570
                  #            IOUT                                               REA00580
                C                                                                   REA00590
ISN 0007          INTEGER  CLASS                                                   REA00600
ISN 0008          COMMON /DATA/ IDSR(250)      ,IDYLSR(250)                 ,     REA00610
                  #            CLASS1(250)     ,                                  REA00620
                  #            DACES(250)      ,YDACES(250) ,TAREA(250)    ,      REA00630
                  #            YLDEST(250)     ,VARTY(250)  ,VARESY(250)   ,      REA00640
                  #            HSACRE(250,10)  ,HRATYR(250)                       REA00650
                C                                                                   REA00660
                C                1       2       3       4       5       6       7  REA00670
ISN 0009          DATA NAMES/'AREA', 'HIST', 'HMAT', 'RATI', 'GAP ', 'OPTI', 'SCAL',REA00680
                C       8       9       10      11      12      13      14      15 REA00690
                  1 'CHEC', 'JOIN', 'UNIT', 'CROP', 'COMM', '    ', 'PZON', 'END'/ REA00700
                C                                                                   REA00710
                C ********************** PROGRAM BEGINS ********************************REA00720
                C                                                                   REA00730
```

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                C  FIND THE NUMBER OF HISTORICAL YEARS (NHSYRS) FROM CONTROL CARD FILE  REA00740
                C                                                                      REA00750
   ISN 0010      3    READ(4, 610, ERR = 999, END = 999) KEYWD, TEMP1, TEMP2,          REA00760
                     *                                   (LINE(I), I = 11,80)        REA00770
   ISN 0011           IF (KEYWD .NE. NAMES(2)) GO TO 3                                REA00780
   ISN 0013           KOUNT = NUMBR(LINE, NUMBER)                                     REA00790
   ISN 0014           NHSYRS = NUMBER(1)                                              REA00800
   ISN 0015           REWIND 4                                                        REA00810
                C                                                                      REA00820
                C  THE SUBROUTINE RDATA WILL READ THE DATA FILE AND RETURN THE DATA    REA00830
                C  TO THE COMMON BLOCK OF DATA.                                        REA00840
                C                                                                      REA00850
   ISN 0016           CALL RDATA(NHSYRS, NORECS)                                      REA00860
                C                                                                      REA00870
                C  INITIALIZE VARIABLES:                                               REA00880
                C     IERROR IS A ERROR FLAG RETURNED TO THE MAIN PROGRAM.             REA00890
                C     LINENO IS A COUNT OF THE LINES IN THE CONTROL CARD FILE.         REA00900
                C     ITHROW IS THE I-TH ROW OF THE ARBSET MATRIX.                     REA00910
                C                                                                      REA00920
   ISN 0017           IERROR = 0                                                      REA00930
   ISN 0018           LINENO = 0                                                      REA00940
   ISN 0019           ITHROW = 0                                                      REA00950
                C                                                                      REA00960
                C  SET DEFAULT VALUES OF VARIABLES                                     REA00970
                C                                                                      REA00980
   ISN 0020           NAS    = 0                                                      REA00990
   ISN 0021           NHSYRS = 0                                                      REA01000
   ISN 0022           NYRS1H = 0                                                      REA01010
   ISN 0023           RATOYR = 0                                                      REA01020
   ISN 0024           GAP    = 0                                                      REA01030
   ISN 0025           ISCALE = 1                                                      REA01040
   ISN 0026           NARB   = 0                                                      REA01050
   ISN 0027           IOUT   = 0                                                      REA01060
                C                                                                      REA01070
                C  INITIALIZE JOIN(I,J) MATRIX TO ZERO                                 REA01080
                C                                                                      REA01090
   ISN 0028           DO 6  I = 1, 250                                                REA01100
   ISN 0029              DO 6  J = 1, 250                                             REA01110
   ISN 0030                 JOIN(I,J) = 0                                             REA01120
   ISN 0031      6    CONTINUE                                                        REA01130
                C                                                                      REA01140
                C  INITIALIZE ARBSET MATRIX TO ZERO                                    REA01150
                C                                                                      REA01160
   ISN 0032           DO 8  I = 1,20                                                  REA01170
   ISN 0033              DO 8  J = 1, 250                                             REA01180
   ISN 0034                 ARBSET(I,J) = 0                                           REA01190
   ISN 0035      8    CONTINUE                                                        REA01200
                C                                                                      REA01210
                C  WRITE HEADING FOR INPUT SUMMARY                                     REA01220
                C                                                                      REA01230
   ISN 0036           WRITE(6, 600)                                                   REA01240
   ISN 0037      600  FORMAT(' INPUT SUMMARY ')                                       REA01250
                C                                                                      REA01260
                C  READ A LINE.    KEYWD IS THE KEY WORD                               REA01270
                C  CONTINUATIONS OF THE LINE ARE READ IN THE SUBROUTINE NUMBR.         REA01280
                C                                                                      REA01290
   ISN 0038      10   READ(4, 610, ERR=999, END=400) KEYWD, TEMP1, TEMP2,             REA01300
                     *                                   (LINE(I), I = 11,80)        REA01310
   ISN 0039      610  FORMAT(A4, A4, A2, 70A1)                                        REA01320
   ISN 0040           LINENO = LINENO + 1                                             REA01330
                C                                                                      REA01340
                C  PRINT INPUT LINE ON SUMMARY REPORT                                  REA01350
                C                                                                      REA01360
   ISN 0041           WRITE(6,620) KEYWD, TEMP1, TEMP2, (LINE(I), I = 11,80)          REA01370
   ISN 0042      620  FORMAT(1X, A4, A4, A2, 70A1)                                    REA01380
                C                                                                      REA01390
                C  THE FUNCTION NUMBR CONVERTS COL 11-80 TO A SERIES OF NUMBERS        REA01400
                C  AND STORES THEM IN THE ARRAY NUMBER.  ALSO IT COUNTS THE NUMBER OF  REA01410
                C  NUMBERS ON THE LINE.  IF THIS LINE HAPPENS TO BE CHARACTER DATA,     REA01420
                C  THIS RESULT WILL BE IGNORED.                                        REA01430
                C                                                                      REA01440
   ISN 0043           KOUNT = NUMBR(LINE, NUMBER).                                    REA01450
                C                                                                      REA01460
   ISN 0044           DO 20  I = 1,15                                                 REA01470
   ISN 0045              INDEX = I                                                    REA01480
   ISN 0046              IF( KEYWD .EQ. NAMES(I)) GO TO 30                            REA01490
   ISN 0048      20   CONTINUE                                                        REA01500
                C                                                                      REA01510
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                C  UNDEFINED LINE TYPE                                                  REA01520
                C                                                                       REA01530
ISN 0049              WRITE(6, 630) KEYWD                                               REA01540
ISN 0050         630  FORMAT(' UNDEFINED NAME IN COLS 1-4: ',A4)                       REA01550
ISN 0051              WRITE(3, 631) KEYWD, (LINE(I), I = 11, 80)                        REA01560
ISN 0052         631  FORMAT(' UNDEFINED NAME IN COLS 1-4',' ',/,1X,A4,2X,80A1)         REA01570
ISN 0053              IERROR = 1                                                        REA01580
ISN 0054              GO TO 10                                                          REA01590
                C                                                                       REA01600
                C  VALID LINE TYPE, PROCESS DATA                                        REA01610
                C                                                                       REA01620
ISN 0055         30   GO TO(110,120,130,140,150,160,170,180,240,190,200,210,10,300,400),REA01630
                     1      INDEX                                                      REA01640
                C                                                                       REA01650
ISN 0056        110   NAS = NUMBER(1)                                                   REA01660
                C                                                                       REA01670
                C  CHECK IF:                                                            REA01680
                C    1)  NUMBER OF RECORDS FROM DATA FILE EXCEEDS 250 MAXIMUM.          REA01690
                C    2)  NUMBER OF ACREAGE STRATA REPORTED IN CONTROL CARD FILE AGREES  REA01700
                C        WITH NUMBER READ IN DATA FILE.                                 REA01710
                C                                                                       REA01720
ISN 0057              IF (NORECS .GT. 250)  STOP 10110                                  REA01730
ISN 0059              IF (NAS .EQ. NORECS) GO TO 10                                     REA01740
ISN 0061              WRITE(3, 635) NAS, NORECS                                         REA01750
ISN 0062              WRITE(6, 635) NAS, NORECS                                         REA01760
ISN 0063         635  FORMAT(' NO. OF AC. ST. REPORTED IN PARAMETER FILE',I3,/,        REA01770
                     1       ' DOESNOT = NO. IN DATA FILE',I3,'. PROGRAM USES LATTER.') REA01780
ISN 0064              NAS = NORECS                                                      REA01790
ISN 0065              GO TO 10                                                          REA01800
ISN 0066         120  NHSYRS = NUMBER(1)                                                REA01810
ISN 0067              GO TO 10                                                          REA01820
ISN 0068         130  NYRSIH = NUMBER(1)                                                REA01830
ISN 0069              GO TO 10                                                          REA01840
ISN 0070         140  RATOYR = NUMBER(1)                                                REA01850
ISN 0071              GO TO 10                                                          REA01860
ISN 0072         150  GAP = NUMBER(1)                                                   REA01870
ISN 0073              GO TO 10                                                          REA01880
ISN 0074         160  NARB = NUMBER(1)                                                  REA01890
ISN 0075              IF (NARB .LE. 20) GO TO 10                                        REA01900
ISN 0077              NARB = 20                                                         REA01910
ISN 0078              WRITE(3, 637)                                                     REA01920
ISN 0079              WRITE(6, 637)                                                     REA01930
ISN 0080         637  FORMAT(' MORE THAN 20 OPTIONAL SETS REPORTED IN CONTROL CARD FILE.REA01940
                     1 ',/,' NUMBER OF ARBITRARY SETS.  NARB. IS SET TO 20')          REA01950
ISN 0081              GO TO 10                                                          REA01960
ISN 0082         170  ISCALE = NUMBER(1)                                                REA01970
ISN 0083              GO TO 10                                                          REA01980
ISN 0084         180  IOUT = NUMBER(1)                                                  REA01990
ISN 0085              GO TO 10                                                          REA02000
                C                                                                       REA02010
                C  SAVE THE UNITS                                                       REA02020
                C                                                                       REA02030
ISN 0086         190  DO 195  I = 11, 80                                                REA02040
ISN 0087              IUNITS(I) = LINE(I)                                               REA02050
ISN 0088         195  CONTINUE                                                          REA02060
ISN 0089              GO TO 10                                                          REA02070
                C                                                                       REA02080
                C  SAVE THE CROP TYPE                                                   REA02090
                C                                                                       REA02100
ISN 0090         200  DO 205  I = 11,80                                                REA02110
ISN 0091              ICROP(I) = LINE(I)                                                REA02120
ISN 0092         205  CONTINUE                                                          REA02130
ISN 0093              GO TO 10                                                          REA02140
                C                                                                       REA02150
                C  COMMENT CARD--ALREADY ECHOED IN SUMMARY--SKIP IT                     REA02160
                C                                                                       REA02170
ISN 0094        210   GO TO 10                                                          REA02180
                C                                                                       REA02190
                C  SET UP THE JOIN MATRIX                                               REA02200
                C                                                                       REA02210
ISN 0095         240  IF (KOUNT .GT. 1) GO TO 250                                      REA02220
ISN 0097              WRITE(3, 640) LINENO, (LINE(I), I = 11, 80)                       REA02230
ISN 0098              WRITE(6, 640) LINENO, (LINE(I), I = 11, 80)                       REA02240
ISN 0099         640  FORMAT(' SINGLE STRATUM IGNORED IN LINE ',I3,/,5X,80A1)          REA02250
ISN 0100              GO TO 10                                                          REA02260
ISN 0101         250  DO 255 I = 1, KOUNT                                               REA02270
ISN 0102              IJOIN(I) = NUMBER(I)                                              REA02280
ISN 0103         255  CONTINUE                                                          REA02290
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                C                                                                REA02300
                C  FIND THE INDEX OF 1ST ACREAGE STRATUM.                        REA02310
                C                                                                REA02320
ISN 0104              DO 270  J = 1, NAS                                         REA02330
ISN 0105                 IF( IJOIN(I) .NE. IDSR(J)) GO TO 270                    REA02340
ISN 0107                 INXROW = J                                              REA02350
ISN 0108                 GO TO 275                                               REA02360
ISN 0109               270  CONTINUE                                            REA02370
ISN 0110              IERROR = 2                                                 REA02380
ISN 0111              WRITE(3, 650) IJOIN(I), LINENO                             REA02390
ISN 0112              WRITE(6, 650) IJOIN(I), LINENO                             REA02400
ISN 0113               650  FORMAT(' UNIDENTIFIED STRATUM NUMBER IN JOIN STATEMENT: ',I10,  REA02410
                     1        ', LINE NO.',I3)                                  REA02420
ISN 0114              GO TO 10                                                   REA02430
                C                                                                REA02440
                C  FIND INDICES OF THE REMAINING ACREAGE STRATA.                 REA02450
                C                                                                REA02460
ISN 0115               275  DO 285  I = 2, KOUNT                                REA02470
ISN 0116                    DO 280  J = 1, NAS                                   REA02480
ISN 0117                       IF(IJOIN(I) .NE. IDSR(J)) GO TO 280               REA02490
ISN 0119                       INXCOL = J                                        REA02500
                C                                                                REA02510
                C  SET JOIN(I,J) = 1 IF THE I-TH ACREAGE STRATUM IS ELIGIBLE TO BE  REA02520
                C  JOINED WITH THE J-TH.                                         REA02530
                C                                                                REA02540
ISN 0120                       JOIN(INXROW, INXCOL) = 1                          REA02550
ISN 0121                       GO TO 285                                         REA02560
ISN 0122               280     CONTINUE                                          REA02570
ISN 0123                       IERROR = 2                                        REA02580
ISN 0124                       WRITE(3,650) IJOIN(I), LINENO                     REA02590
ISN 0125                       WRITE(6,650) IJOIN(I), LINENO                     REA02600
ISN 0126               285  CONTINUE                                            REA02610
ISN 0127              GO TO 10                                                   REA02620
                C                                                                REA02630
                C  SET UP THE MATRIX ARBSET                                      REA02640
                C                                                                REA02650
                C  ARBSET(I,J) = 1 IF THE J-TH ACREAGE STRATUM IS IN THE I-TH ARBITRARY  REA02660
                C  SET OR PSUEDO-ZONE.                                           REA02670
                C  THE MAXIMUM NUMBER OF ARBITRARY SETS IS 20.                   REA02680
                C  THE MAXIMUM NUMBER OF ACREAGE STRATA IN A SET IS 249.         REA02690
                C                                                                REA02700
ISN 0128               300  IF(ITHROW .GE. 20) GO TO 330                        REA02710
ISN 0130              ITHROW = ITHROW + 1                                        REA02720
ISN 0131              DO 320  I = 1, KOUNT                                       REA02730
ISN 0132                 DO 310  J = 1,NAS                                       REA02740
ISN 0133                    IF(NUMBER(I) .NE. IDSR(J) ) GO TO 310                REA02750
ISN 0135                    INXCOL = J                                           REA02760
ISN 0136                    ARBSET(ITHROW, INXCOL) = 1                           REA02770
ISN 0137                    GO TO 320                                            REA02780
ISN 0138               310     CONTINUE                                          REA02790
ISN 0139                       IERROR = 3                                        REA02800
ISN 0140                       WRITE(3, 660)  NUMBER(I), LINENO                  REA02810
ISN 0141                       WRITE(6, 660)  NUMBER(I), LINENO                  REA02820
ISN 0142               660     FORMAT(' UNIDENTIFIED STRATUM NUMBER IN PZONE STATEMENT: ',I5,  REA02830
                     1              ', LINE NO.', I3)                           REA02840
ISN 0143               320  CONTINUE                                            REA02850
ISN 0144              GO TO 10                                                   REA02860
ISN 0145               330  WRITE(3,670)                                        REA02870
ISN 0146              WRITE(6,670)                                               REA02880
ISN 0147               670  FORMAT(' NO MORE THAN 20 ARBITRARY SETS OF STRATA ARE ACCEPTED')  REA02890
ISN 0148              GO TO 10                                                   REA02900
                C                                                                REA02910
                C  END OF ROUTINE                                                REA02920
                C                                                                REA02930
ISN 0149                400 IF (RATOYR.LE.0) STOP 10400                          REA02940
ISN 0151                    IF (RATOYR.GT.NHSYRS) STOP 10401                     REA02950
ISN 0153                    DO 410 I = 1,NAS                                     REA02960
ISN 0154                       HRATYR(I) = HSACRE(I,RATOYR)                      REA02970
ISN 0155                410 CONTINUE                                             REA02980
ISN 0156                    IF (ITHROW .EQ. NARB) GO TO 415                      REA02990
ISN 0158                    WRITE(3, 680) NARB, ITHROW                           REA03000
ISN 0159                    WRITE(6, 680) NARB, ITHROW                           REA03010
ISN 0160                680 FORMAT(' NO. OF OPTIONAL SETS IN CONTROL CARD FILE:',I3,/,  REA03020
                     1          ' DOES NOT EQUAL NO. OF PZONES COUNTED:',I3,/,   REA03030
                     2          ' PROGRAM USES THE LATTER.')                     REA03040
ISN 0161                415 NARB = ITHROW                                        REA03050
                C                                                                REA03060
                C  CHECK IF JOIN IS SYMMETRIC WITH ZEROES ON THE DIAGONAL.       REA03070
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                C                                                                REA03080
   ISN 0162      415  DO 430  I =1, NAS                                          REA03090
   ISN 0163           DO 420  J= I, NAS                                          REA03100
   ISN 0164              IF (JOIN(I,J) .EQ. JOIN(J,I)) GO TO 420                 REA03110
   ISN 0166              JOIN(I,J) = 1                                           REA03120
   ISN 0167              JOIN(J,I) = 1                                           REA03130
   ISN 0168              WRITE(3, 685) I, J                                      REA03140
   ISN 0169              WRITE(6, 685) I, J                                      REA03150
   ISN 0170      685     FORMAT(' JOIN MATRIX IS NOT SYMMETRIC AT',I3,'-TH ROW AND',REA03160
                1           I3,'-TH COLUMN',/,' CORRECTION:BOTH ELEMENTS SET TO 1.') REA03170
   ISN 0171      420     CONTINUE                                                REA03180
   ISN 0172              IF (JOIN(I,I) .EQ. 0) GO TO 430                         REA03190
   ISN 0174              JOIN(I,I) = 0                                           REA03200
   ISN 0175              WRITE(3, 688) I                                         REA03210
   ISN 0176              WRITE(6, 688) I                                         REA03220
   ISN 0177      688     FORMAT(1H ,I3,'-TH DIAGONAL POSITION OF JOIN MATRIX WAS NON-',REA03230
                1          'ZERO.',/,' THIS INDICATES THAT AN AREA STRATUM IS JOIN',REA03240
                2          'ED TO ITSELF IN A JOIN STATEMENT.',/,' CORRECTION: DIA',REA03250
                3          'GONAL ELEMENT IS SET TO ZERO.')                      REA03260
   ISN 0178      430  CONTINUE                                                   REA03270
                C                                                                REA03280
                C   FINAL CHECK TO SEE THAT JOIN MATRIX IS SYMMETRIC.           REA03290
                C                                                                REA03300
   ISN 0179           DO 440 I = 1,NAS                                          REA03310
   ISN 0180            DO 440 J = 1,NAS                                         REA03320
   ISN 0181              IF (JOIN(I,J).EQ.JOIN(J,I)) GO TO 440                  REA03330
   ISN 0183              STOP 10440                                             REA03340
   ISN 0184      440 CONTINUE                                                   REA03350
                C                                                                REA03360
                C  IF IOUT HAS A VALUE OF 2, THEN A SUMMARY OF THE INPUTTED      REA03370
                C  CONTROL FILE AND DATA FILE IS PRINTED ON A SEPARATE PAGE.     REA03380
                C                                                                REA03390
   ISN 0185           IF (IOUT .EQ. 2) CALL CHECK1                              REA03400
   ISN 0187           RETURN                                                    REA03410
   ISN 0188      999  WRITE(3,690)                                              REA03420
   ISN 0189           WRITE(6,690)                                              REA03430
   ISN 0190      690  FORMAT(' ERROR IN READING THE PARAMETER FILE.')           REA03440
   ISN 0191           STOP 10999                                                REA03450
   ISN 0192           END                                                       REA03460
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*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS																		
I	0010	0010	0010	0028	0030	0032	0034	0038	0038	0038	0041	0041	0041	0044	0045	0046	0051	0051	0051
	0086	0087	0087	0090	0091	0091	0097	0097	0097	0098	0098	0098	0101	0102	0102	0115	0117	0124	0125
	0131	0133	0140	0141	0153	0154	0154	0162	0163	0164	0164	0166	0167	0168	0169	0172	0172	0174	0174
	0175	0176	0179	0181	0181														
J	0029	0030	0033	0034	0104	0105	0107	0116	0117	0119	0132	0133	0135	0163	0164	0164	0166	0167	0168
	0169	0180	0181	0181															
GAP	0004	0006	0024	0072															
NAS	0006	0020	0056	0059	0061	0062	0064	0104	0116	0132	0153	0162	0163	0179	0180				
IDSR	0008	0105	0117	0133															
IOUT	0006	0027	0084	0185															
JOIN	0005	0006	0030	0120	0164	0164	0166	0167	0172	0174	0181	0181							
LINE	0003	0010	0013	0038	0041	0043	0051	0087	0091	0097	0098								
NARB	0006	0026	0074	0075	0077	0156	0158	0159	0161										
DACES	0008																		
ICROP	0006	0091																	
IJOIN	0003	0102	0105	0111	0112	0117	0124	0125											
INDEX	0045	0055																	
KEYWD	0010	0011	003A	0041	0046	0049	0051												
KOUNT	0013	0043	0095	0101	0115	0131													
NAMES	0003	0009	0011	0046															
NUMBR	0013	0043																	
RDATA	0016																		
TAREA	0008																		
TEMP1	0010	003A	0041																
TEMP2	0010	003A	0041																
VARTY	0008																		
ARRSET	0005	0006	0034	0136															
CHECK1	0185																		
CLASS1	0007	0008																	
HRATYR	0008	0154																	
HSACRE	0008	0154																	
IDYLSR	0008																		
IERROR	0002	0017	0053	0110	0123	0139													
INXCOL	0119	0120	0135	0136															
INXROW	0107	0120																	

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS															
ISCALE	0006	0025	0082													
ITHROW	0019	0128	0130	0130	0136	0156	0158	0159	0161							
IUNITS	0006	0087														
LINENO	0018	0040	0040	0097	0098	0111	0112	0124	0125	0140	0141					
NHSYRS	0006	0014	0016	0021	0066	0151										
NORECS	0016	0057	0059	0061	0062	0064										
NUMBER	0003	0013	0014	0043	0056	0066	0068	0070	0072	0074	0082	0084	0102	0133	0140	0141
NYRS1H	0006	0022	0068													
RATOYR	0004	0006	0023	0070	0149	0151	0154									
READFL	0002															
VARESY	0008															
VDACES	0008															
YLDEST	0008															

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES														
3	0010	0011														
6	0031	0028	0029													
8	0035	0032	0033													
10	0038	0054	0055	0059	0065	0067	0069	0071	0073	0075	0081	0083	0085	0089	0093	0094	0100	0114
		0127	0144	0148														
20	0048	0044																
30	0055	0046																
110	0056	0055																
120	0066	0055																
130	0068	0055																
140	0070	0055																
150	0072	0055																
160	0074	0055																
170	0082	0055																
180	0084	0055																
190	0086	0055																
195	0088	0086																
200	0090	0055																
205	0092	0090																
210	0094	0055																
240	0095	0055																
250	0101	0095																
255	0103	0101																
270	0109	0104	0105															
275	0115	0108																
280	0122	0116	0117															
285	0126	0115	0121															
300	0128	0055																
310	0138	0132	0133															
320	0143	0131	0137															
330	0145	0128																
400	0149	0038	0055															
410	0155	0153																
415	0162	0156																
420	0171	0163	0164															
430	0178	0162	0172															
440	0184	0179	0180	0181														
600	0037	0036																
610	0039	0010	0038															
620	0042	0041																
630	0050	0049																
631	0052	0051																
635	0063	0061	0062															
637	0080	0078	0079															
640	0099	0097	0098															
650	0113	0111	0112	0124	0125													
660	0142	0140	0141															
670	0147	0145	0146															
680	0160	0158	0159															
685	0170	0168	0169															
688	0177	0175	0176															
690	0190	0188	0189															
999	0188	0010	0010	0038														

/ READFL / SIZE OF PROGRAM 001542 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.

I	SF		I*4	000510	J	SF		I*4	000514	GAP	S	C	I*4	000010	NAS	SF	C	I*4	000[illegible]8
IDSR		C	I*4	000000	IOUT	S	C	I*4	0211F4	JOIN	S	C	I*2	000298	LINE	SFA		I*4	000[illegible]4
NARB	SF	C	I*4	01EAE0	DACES		C	R*4	NR	ICROP	S	C	I*4	000158	IJOIN	SF		I*4	00068[illegible]
INDEX	SF		I*4	000518	KEYWD	SF		I*4	00051C	KOUNT	SF		I*4	000520	NAMES			I*4	00068[illegible]
NUMBR	F	XF	I*4	000000	RDATA	SF	XF		000000	TAREA		C	R*4	NR	TEMP1	SF		R*4	000524
TEMP2	SF		R*4	000528	VARTY		C	R*4	NR	ARBSET	S	C	I*2	01EAE4	CHECK1	SF	XF		000000
CLASS1		C	I*4	NR	HRATYR	S	C	R*4	004A38	HSACRE	F	C	R*4	002328	IBCOM#	F	XF	I*4	000000
IDYLSR		C	I*4	NR	IERROR	S		I*4	00052C	INXCOL	SF		I*4	000530	INXROW	SF		I*4	000534
ISCALE	S	C	I*4	000014	ITHROW	SF		I*4	000538	IUNITS	S	C	I*4	000018	LINENO	SF		I*4	00053C
NHSYRS	SFA	C	I*4	000004	NORECS	SFA		I*4	000540	NUMBER	F	A	I*4	0006F8	NYRS1H	S	C	I*4	000008
RATOYR	SF	C	I*4	00000C	READFL			R*4	000544	VARESY		C	R*4	NR	VDACES		C	R*4	NR
YLDEST		C	R*4	NR															

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * PARAM* SIZE OF BLOCK 0211F8 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NAS	I*4	000000	NHSYRS	I*4	000004	NYRS1H	I*4	000008	RATOYR	I*4	00000C
GAP	I*4	000010	ISCALE	I*4	000014	IUNITS	I*4	000018	ICROP	I*4	000158
JOIN	I*2	000298	NARB	I*4	01EAE0	ARBSET	I*2	01EAE4	IOUT	I*4	0211F4

NAME OF COMMON BLOCK * DATA* SIZE OF BLOCK 004E20 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
IDSR	I*4	000000	IDYLSR	I*4	0003E8 NR	CLASS1	I*4	000700 NR	DACES	R*4	000886 NR
VDACES	R*4	000FA0 NR	TAREA	R*4	001388 NR	YLDEST	R*4	001770 NR	VARTY	R*4	001858 NR
VARESY	R*4	001F40 NR	HSACRE	R*4	002328	HRATYR	R*4	004A38			

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
3	10	000B10	6	31	000BFA	8	35	000C40	10	38	000C78
20	48	000D38	30	55	000DA0	110	56	000DB8	120	66	000E3C
130	68	000E48	140	70	000E54	150	72	000E6[illegible]	160	74	000E6C
170	82	000EB0	180	84	000EBC	190	86	000ECC	195	88	000EEC
200	90	000F02	205	92	000F22	210	94	000F38	240	95	000F3C
250	101	000FAB	255	103	000FC4	270	109	000FFE	275	115	001064
280	122	0010AC	285	126	001120	300	128	001136	310	138	001192
320	143	001204	330	145	00121A	400	149	001248	410	155	0012A8
415	162	001318	420	171	0013C0	430	178	00143C	440	184	001490
999	188	0014D4									

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100002	10	000B38	100005	13	000B74	100006	29	000B9E	100007	30	000BE2
100008	32	000C0C	100009	33	000C1E	100010	33	000C22	100011	34	000C26
100012	36	000C52	100013	38	000C64	100014	38	000C90	100019	45	000D1E
100020	49	000D4A	100024	58	000DCC	100025	59	000DDA	100026	61	000DE6
100027	77	000E7C	100028	87	000ED4	100029	89	000EFE	100030	91	000F0A
100031	93	000F36	100032	96	000F44	100037	102	000FAC	100038	104	000FD6
100039	105	000FDA	100040	107	000FF2	100041	110	001010	100042	116	00106C
100043	117	001070	100044	119	001090	100045	123	0010BE	100046	127	001132
100047	130	001142	100048	132	001150	100049	133	001154	100050	135	001174
100051	139	0011A4	100052	144	001216	100053	150	001252	100054	151	001260
100055	152	00126C	100056	153	00127A	100057	154	00127E	100058	156	00128A
100059	158	0012C6	100060	163	00131C	100061	164	001324	100062	166	001350
100063	172	0013D2	100064	174	0013EC	100065	179	00144E	100066	180	001452
100067	181	001456	100068	183	001482	100069	185	0014A2	100070	185	0014B4
100071	186	0014C4	100072	187	0014CC						

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
600	37	000028	610	39	000038	620	42	000047	630	50	000055
631	52	000078	635	63	0000A4	637	80	00010C	640	99	00017C
650	113	0001A9	660	142	0001ED	670	147	000232	680	160	00026C
685	170	0002F4	688	177	00034B	690	190	00040C			

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 191, PROGRAM SIZE = 5442, SUBPROGRAM NAME =READFL

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ******

185K BYTES OF CORE NOT USED

REQUESTED OPTIONS:

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

```
ISN 0002          SUBROUTINE REGION                                                  REG00010
                  C-------------------------------------------------------------------CREG00020
                  C                                                                   CREG00030
                  C  S U B R O U T I N E                                              CREG00040
                  C  -------------------                                              CREG00050
                  C      REGION                                                       CREG00060
                  C                                                                   CREG00070
                  C  H I S T O R Y                                                    CREG00080
                  C  -------------                                                    CREG00090
                  C      PROGRAMMER ..............'GARY W. SHAW ,LEMSCO ,7/15/81    CREG00100
                  C                                                                   CREG00110
                  C  P U R P O S E                                                    CREG00120
                  C  -------------                                                    CREG00130
                  C      TO CALCULATE THE AREA AND PRODUCTION ESTIMATES FOR THE ENTIRE CREG00140
                  C      SET OF ACREAGE STRATA OF THE INPUTTED DATA SET.              CREG00150
                  C                                                                   CREG00160
                  C  SUBROUTINES REQUIRED                                             CREG00170
                  C  --------------------                                             CREG00180
                  C      EST2                                                         CREG00190
                  C                                                                   CREG00200
                  C  R E M A R K S                                                    CREG00210
                  C  -------------                                                    CREG00220
                  C                                                                   CREG00230
                  C-------------------------------------------------------------------CREG00240
ISN 0003          INTEGER  RATOYR ,GAP                                               REG00250
ISN 0004          INTEGER*2  JOIN, ARBSET                                            REG00260
ISN 0005          COMMON /PARAM/NAS          ,NHSYRS       ,NYRSIH       ,         REG00270
                  #              RATOYR      ,GAP                        ,         REG00280
                  #              ISCALE      ,IUNITS(80)   ,ICROP(80)    ,         REG00290
                  #              JOIN(250,250),NARB        ,ARBSET(20,250),         REG00300
                  #              IOUT                                              REG00310
                  C                                                                 REG00320
ISN 0006          INTEGER  CLASS1                                                   REG00330
ISN 0007          COMMON /DATA/ IDSR(250)    ,IDYLSR(250)                  ,        REG00340
                  #              CLASS1(250) ,                                     REG00350
                  #              DACES(250)  ,VDACES(250) ,TAREA(250)      ,       REG00360
                  #              YLDEST(250) ,VARTY(250)  ,VARESY(250)     ,       REG00370
                  #              HSACRE(250,10),HRATYR(250)                        REG00380
                  C-------------------------------------------------------------------CREG00390
                  C     DIMENSIONS FOR LOCAL VARIABLES.                             CREG00400
                  C-------------------------------------------------------------------CREG00410
ISN 0008          DIMENSION IMASK(250),  ITEMP(6)                                   REG00420
ISN 0009          DATA      UDLINE /'    '/                                         REG00430
                  C**************** S U B R O U T I N E   STARTS **********************CREG00440
ISN 0010          DO 10 I = 1,NAS                                                   REG00450
ISN 0011          IMASK(I) = 1                                                      REG00460
ISN 0012       10 CONTINUE                                                          REG00470
                  C                                                                 REG00480
ISN 0013          CALL EST2(IMASK, A,AMSPE, P,PMSPE)                                REG00490
                  C                                                                 REG00500
                  C-------------------------------------------------------------------CREG00510
                  C                        O U T P U T                              CREG00520
                  C-------------------------------------------------------------------CREG00530
ISN 0014          WRITE(6,900)                                                      REG00540
ISN 0015          WRITE(6,910)                                                      REG00550
ISN 0016          IOUT6 = 0                                                         REG00560
ISN 0017          DO 30 I = 1,NAS                                                   REG00570
ISN 0018            IF (IOUT6.EQ.6) WRITE(6,920) (ITEMP(J), J =1,6)                 REG00580
ISN 0020            IF (IOUT6.EQ.6) IOUT6 = 0                                       REG00590
ISN 0022            IF (IMASK(I).EQ.1) IOUT6 = IOUT6 + 1                            REG00600
ISN 0024            IF (IMASK(I).EQ.1) ITEMP(IOUT6) = IDSR(I)                       REG00610
ISN 0026       30 CONTINUE                                                          REG00620
ISN 0027          IF (IOUT6.GT.0) WRITE(6,920) (ITEMP(J), J = 1,IOUT6)            REG00630
ISN 0029          WRITE(6,930) (UDLINE,I = 1,12)                                  REG00640
ISN 0030          ARMSPE = SQRT(AMSPE)                                            REG00650
ISN 0031          PRMSPE = SQRT(PMSPE)                                            REG00660
ISN 0032          WRITE(6,940)  A,AMSPE,ARMSPE,P,PMSPE,PRMSPE                     REG00670
ISN 0033          RETURN                                                          REG00680
                  C-------------------------------------------------------------------CREG00690
                  C     F O R M A T S                                               CREG00700
                  C-------------------------------------------------------------------CREG00710
ISN 0034       900 FORMAT('1',20X,'E S T I M A T E S   FOR  REGION')               REG00720
ISN 0035       910 FORMAT(///,10X,                                                 REG00730
```

```
                #     'THE REGION INCLUDES THE FOLLOWING ACREAGE STRATA : ',//)                REG00740
ISN 0036        920 FORMAT(10X,6(I5,3X))                                                     REG00750
ISN 0037        930 FORMAT(/,'+',7X,12A4)                                                    REG00760
ISN 0038        940 FORMAT(//,38X,'AREA ESTIMATE =',F18.4,                                   REG00770
                #       //,10X,'ESTIMATE OF MEAN SQUARED PREDICTION ERROR =',F18.4,        REG00780
                #       //,17X,'ROOT MEAN SQUARED PREDICTION ERROR =',F18.4,               REG00790
                #      ////,32X,'PRODUCTION ESTIMATE =',F18.4,                             REG00800
                #       //,10X,'ESTIMATE OF MEAN SQUARED PREDICTION ERROR =',F18.4,        REG00810
                #       //,17X,'ROOT MEAN SQUARED PREDICTION ERROR =',F18.4    )           REG00820
ISN 0039         RETURN                                                                      REG00830
ISN 0040         END                                                                         REG00840
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS							
A	0013	0032						
I	0010	0011	0017	0022	0024	0024	0029	0029
J	0018	0018	0018	0027	0027	0027		
P	0013	0032						
GAP	0003	0005						
NAS	0005	0010	0017					
EST2	0013							
IDSR	0007	0024						
IOUT	0005							
JOIN	0004	0005						
NARB	0005							
SQRT	0030	0031						
AMSPE	0013	0030	0032					
DACES	0007							
ICROP	0005							
IMASK	0008	0011	0013	0022	0024			
IOUT6	0016	0018	0020	0020	0022	0022	0024	0027 0027
ITEMP	0008	0018	0024	0027				
PMSPE	0013	0031	0032					
TAREA	0007							
VARTY	0007							
ARBSET	0004	0005						
ARMSPE	0030	0032						
CLASS1	0006	0007						
HRATYR	0007							
HSACRE	0007							
IDYLSR	0007							
ISCALE	0005							
IUNITS	0005							
NHSYRS	0005							
NYRS1H	0005							
PRMSPE	0031	0032						
RATOYR	0003	0005						
REGION	0002							
UDLINE	0009	0029						
VARESY	0007							
VDACES	0007							
YLDEST	0007							

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES
10	0012	0010
30	0026	0017
900	0034	0014
910	0035	0015
920	0036	0018 0027
930	0037	0029
940	0038	0032

/ REGION / SIZE OF PROGRAM 000866 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
A	SFA	R*4	000234	I	SF	I*4	000238	J	F	I*4	00023C	P	SFA	R*4	000240
GAP	C	I*4	NR	NAS	F C	I*4	000000	EST2	SF XF		000000	IDSR	F C	I*4	000000
IOUT	C	I*4	NR	JOIN	C	I*2	NR	NARB	C	I*4	NR	SQRT	F XF	R*4	000000
AMSPE	SFA	R*4	000244	DACES	C	R*4	NR	ICROP	C	I*4	NR	IMASK	SFA	I*4	000260
IOUT6	SF	I*4	000248	ITEMP	SF	I*4	000648	PMSPE	SFA	R*4	00024C	TAREA	C	R*4	NR
VARTY	C	R*4	NR	ARBSET	C	I*2	NR	ARMSPE	SF	R*4	000250	CLASS1	C	I*4	NR
HRATYR	C	R*4	NR	HSACRE	C	R*4	NR	IRCOM#	F XF	R*4	000000	IDYLSR	C	I*4	NR
ISCALE	C	I*4	NR	IUNITS	C	I*4	NR	NHSYRS	C	I*4	NR	NYRS1H	C	I*4	NR
PRMSPE	SF	R*4	000254	RATOYR	C	I*4	NR	REGION		R*4	000258	UDLINE	F	R*4	00025C

```
     VARESY      C   R*4     NR      VDACES      C   R*4     NR      YLDEST      C   R*4     NR

                              *****  COMMON INFORMATION  *****

      NAME OF COMMON BLOCK  * PARAM*   SIZE OF BLOCK    0211F8 HEXADECIMAL BYTES

 VAR. NAME  TYPE  REL. ADDR.    VAR. NAME  TYPE  REL. ADDR.    VAR. NAME  TYPE  REL. ADDR.    VAR. NAME  TYPE  REL. ADDR.
      NAS   I*4   000000          NHSYRS   I*4   000004 NR       NYRSIH   I*4   000008 NR       RATOYR   I*4   00000C NR
      GAP   I*4   000010 NR       ISCALE   I*4   000014 NR       IUNITS   I*4   000018 NR         ICROP   I*4   000158 NR
     JOIN   I*2   000298 NR         NARB   I*4   01EAE0 NR       ARBSET   I*2   01EAE4 NR          IOUT   I*4   0211F4 NR

      NAME OF COMMON BLOCK  *  DATA*   SIZE OF BLOCK    004E20 HEXADECIMAL BYTES

 VAR. NAME  TYPE  REL. ADDR.    VAR. NAME  TYPE  REL. ADDR.    VAR. NAME  TYPE  REL. ADDR.    VAR. NAME  TYPE  REL. ADDR.
      IDSR   I*4   000000          IDYLSR   I*4   0003E8 NR       CLASSI   I*4   000700 NR         DACES   R*4   000888 NR
    VDACES   R*4   000FA0 NR         IAREA   R*4   001388 NR       YLDEST   R*4   001770 NR         VARTY   R*4   001B58 NR
    VARESY   R*4   001F40 NR       HSACRE   R*4   002328 NR       HRATYR   R*4   004A38 NR

  SOURCE STATEMENT LABELS

    LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR
       10   12  0006AC            30   26  00076C

  COMPILER GENERATED LABELS

    LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR
   100001    2  00068C       100002   11  0006A2       100003   13  0006BA       100004   18  0006F2
   100005   19  0006FA       100008   20  000724       100009   21  00072C       100010   22  000730
   100011   23  00073E       100012   24  000748       100013   25  000756       100014   27  00077A
   100015   28  000784       100018   29  0007B4

  FORMAT STATEMENT LABELS

    LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR          LABEL  ISN   ADDR
      900   34  000028          910   35  000050          920   36  00008E          930   37  000099

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)
*STATISTICS*     SOURCE STATEMENTS =      39, PROGRAM SIZE =     2150, SUBPROGRAM NAME =REGION
*STATISTICS*  NO  DIAGNOSTICS GENERATED
****** END OF COMPILATION ******                          217K BYTES OF CORE NOT USED
```

REQUESTED OPTIONS:

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

```
ISN 0002          SUBROUTINE STATS                                                  STA00010
                C-----------------------------------------------------------------CSTA00020
                C                                                                 CSTA00030
                C  S U B R O U T I N E                                            CSTA00040
                C  -------------------                                            CSTA00050
                C      STATS                                                      CSTA00060
                C                                                                 CSTA00070
                C  H I S T O R Y                                                  CSTA00080
                C  -------------                                                  CSTA00090
                C      PROGRAMMER ............... GARY W. SHAW, PATRICK M. BROWN CSTA00100
                C                                 LEMSCO, 5/15/81                 CSTA00110
                C                                                                 CSTA00120
                C  P U R P O S E                                                  CSTA00130
                C  -------------                                                  CSTA00140
                C      TO PRINT SUMMARY OUTPUT OF THE INPUTTED DATA AND THE ADJUSTED CSTA00150
                C   ACREAGE STRATA ESTIMATES.                                     CSTA00160
                C                                                                 CSTA00170
                C  SUBROUTINES REQUIRED                                           CSTA00180
                C  --------------------                                           CSTA00190
                C      NONE                                                       CSTA00200
                C                                                                 CSTA00210
                C  R E M A R K S                                                  CSTA00220
                C  -------------                                                  CSTA00230
                C      NOTE THAT THE COEFFICIENT OF VARIATION IS CALCULATED       CSTA00240
                C    BUT IS NOT RETAINED.                                         CSTA00250
                C                                                                 CSTA00260
                C-----------------------------------------------------------------CSTA00270
ISN 0003          INTEGER  RATOYR ,GAP                                            STA00280
ISN 0004          INTEGER*2  JOIN, ARBSET                                         STA00290
ISN 0005          COMMON /PARAM/NAS          ,NHSYRS       ,NYRSIH       ,      STA00300
                 #               RATOYR      ,GAP                        ,      STA00310
                 #               ISCALE      ,IUNITS(80)   ,ICROP(80)    ,      STA00320
                 #               JOIN(250,250) ,NARB       ,ARBSET(20,250),      STA00330
                 #               IOUT                                            STA00340
                C                                                                 STA00350
ISN 0006          INTEGER  CLASS1                                                 STA00360
ISN 0007          COMMON /DATA/ IDSR(250)    ,IDYLSR(250)                  ,      STA00370
                 #               CLASS1(250) ,                             ,      STA00380
                 #               DACES(250)  ,VDACES(250) ,TAREA(250)      ,      STA00390
                 #               YLDEST(250) ,VARIY(250)  ,VARESY(250)     ,      STA00400
                 #               HSACRE(250,10) ,HRATYR(250)                     STA00410
                C                                                                 STA00420
ISN 0008          INTEGER GROUP                                                   STA00430
ISN 0009          COMMON /EST/ NGPRS         ,GROUP(250)   ,HMATRX(250)  ,      STA00440
                 #               BMATRX(250)                               ,      STA00450
                 #               GAMMA(250)  ,XMATRX(250,250) ,XOC1(250)   ,      STA00460
                 #               NUMYS       ,IYDSEQ(50)   ,IFIRST(50)     ,      STA00470
                 #               IYD(250)    ,XD(250)                            STA00480
                C********************* S U B R O U T I N E  STARTS ***************CSTA00490
                C  WRITE TITLES FOR OUTPUT.                                       CSTA00500
                C-----------------------------------------------------------------CSTA00510
ISN 0010          WRITE(6,900)                                                    STA00520
ISN 0011          WRITE(6, 910) (ICROP(J), J = 11,80)                             STA00530
ISN 0012          WRITE(6, 920) (IUNITS(J), J = 11, 80)                           STA00540
                C                                                                 STA00550
                C  A SCALE FACTOR IS AVAILABLE FOR FUTHER REFINEMENTS.            STA00560
                C     WRITE(6, 930) ISCALE                                        STA00570
ISN 0013          WRITE(6, 1000)                                                  STA00580
                C-----------------------------------------------------------------CSTA00590
ISN 0014          DO 10  I = 1, NAS                                               STA00600
                C                                                                 STA00610
                C  INITIALIZE THE COEFFICIENT OF VARIANCE TO ZERO                 STA00620
                C                                                                 STA00630
ISN 0015             CVDACE = 0.0                                                 STA00640
                C                                                                 STA00650
                C  CALCULATE COEFFICIENT OF VARIANCE FOR CLASS 1 DATA             STA00660
                C                                                                 STA00670
ISN 0016             IF (CLASS1(I) .EQ. 1) CVDACE = SQRT( VDACES(I) ) / DACES(I)  STA00680
                    1                                 * 100                       STA00690
                C                                                                 STA00700
                C  WRITE OUTPUT DATA                                              STA00710
                C                                                                 STA00720
ISN 0018             WRITE(6,1010) IDSR(I),DACES(I),VDACES(I),CVDACE,HRATYR(I)    STA00730
```

```
ISN 0019      10    CONTINUE                                                    STA00740
                    C                                                         STA00750
                    C  WRITE TITLES FOR ADDITIONAL OUTPUT.                    STA00760
                    C                                                         STA00770
ISN 0020            WRITE(6,1020)                                             STA00780
ISN 0021            DO 20  I = 1, NAS                                         STA00790
ISN 0022            WRITE(6,1030) IDSR(I), IDYLSR(I), YLDEST(I), VARTY(I), VARESY(I),  STA00800
                   1              GROUP(I)                                    STA00810
ISN 0023      20    CONTINUE                                                  STA00820
ISN 0024            RETURN                                                    STA00830
ISN 0025     900    FORMAT('1',27X,'D A T A   S U M M A R Y '//)              STA00840
ISN 0026     910    FORMAT(' THE CROP IS: ',80A1)                             STA00850
ISN 0027     920    FORMAT(' THE UNITS FOR AREA AND PRODUCTION ARE:',80A1)    STA00860
             C 930  FORMAT(' THE SCALE FACTOR IS ', I6)                       STA00870
ISN 0028    1000    FORMAT(///,                                               STA00880
                   1       38X,'COEFFICIENT',/,37X,'OF VARIATION  ',/,        STA00890
                   2       27X,'VARIANCE     DIRECT     HISTORICAL',/,       STA00900
                   3       16X,'DIRECT',6X,'DIRECT',6X,' AREA  ',5X,'AREA FOR',  STA00910
                   4       /,                                                 STA00920
                   5       5X,'AREA   ',5X,'AREA   ',5X,'AREA   '3X,'ESTIMATE',6X,  STA00930
                   6      'RATIO',/,                                          STA00940
                   7       4X,'STRATA',5X,'ESTIMATE',4X,'ESTIMATE',4X,'(PERCENT)',5X,  STA00950
                   8      'YEAR', //)                                         STA00960
ISN 0029    1010    FORMAT(5X,I5,5X,F8.2,2X,F10.2,6X,F5.1,5X,F8.2)            STA00970
ISN 0030    1020    FORMAT(1H1,///,                                           STA00980
                   1       33X,'VARIANCE',4X,'VARIANCE OF',/,                 STA00990
                   2       1X,'AREA',7X,'YIELD',5X,'YIELD',6X,'OF TRUE',5X,'ESTIMATED'  STA01000
                   3       ,/,                                                STA01010
                   4       1X,'STRATA',5X,'STRATA',3X,'ESTIMATE',5X,'YIELD',8X,'YIELD'  STA01020
                   5       ,8X,'GROUP',//)                                    STA01030
ISN 0031    1030    FORMAT(1X,I5,7X,I3,5X,F8.3,3X,F7.2,6X,F7.2,8X,I3)         STA01040
ISN 0032            END                                                       STA01060
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL	STATEMENT NUMBERS													
I	0014	0016	0016	0016	0018	0018	0018	0018	0021	0022	0022	0022	0022	0022	0022
J	0011	0011	0012	0012	0012										
XD	0009														
GAP	0003	0005													
IYD	0009														
NAS	0005	0014	0021												
IDSR	0007	0018	0022												
IOUT	0005														
JOIN	0004	0005													
NARB	0005														
SQRT	0016														
XOCL	0009														
DACES	0007	0016	0018												
GAMMA	0009														
GROUP	0008	0009	0022												
ICROP	0005	0011													
NGPRS	0009														
NUMYS	0009														
STATS	0002														
TAREA	0007														
VARTY	0007	0022													
ARBSET	0004	0005													
BMATRX	0009														
CLASS1	0006	0007	0016												
CVDACE	0015	0016	0018												
HMATRX	0009														
HRATYR	0007	0018													
HSACRE	0007														
IDYLSR	0007	0022													
IFIRST	0009														
ISCALE	0005														
IUNITS	0005	0012													
IYDSEQ	0009														
NHSYRS	0005														
NYRS1H	0005														
RATOYR	0003	0005													
VARESY	0007	0022													
VDACES	0007	0016	0018												
XMATRX	0009														
YLDEST	0007	0022													

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES
10	0019	0014
20	0023	0021
900	0025	0010
910	0026	0011
920	0027	0012
1000	0028	0013
1010	0029	0018
1020	0030	0020
1030	0031	0022

/ STATS / SIZE OF PROGRAM 000502 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SFA	I*4	0002C4	J	F C	I*4	0002C8	XD	C	R*4	NR	GAP	C	I*4	NR
IYD	C	I*4	NR	NAS	F C	I*4	000000	IDSR	F C	I*4	000000	IOUT	C	I*4	NR
JOIN	C	I*2	NR	NARB	C	I*4	NR	SQRT	F XF	R*4	000000	XQCI	C	R*4	NR
DACES	F C	R*4	000888	GAMMA	C	R*4	NR	GROUP	F C	I*4	000004	ICROP	F C	I*4	000158
NGPRS	C	I*4	NR	NUMYS	C	I*4	NR	STATS		R*4	0002CC	TAREA	C	R*4	NR
VARTY	F C	R*4	001858	ARBSET	C	I*2	NR	BMATRX	C	R*4	NR	CLASS1	C	I*4	0007D0
CVDACE	SF	R*4	0002D0	HMATRX	C	R*4	NR	HRATYR	F C	R*4	004A38	HSACRE	C	R*4	NR
IBCOM#	F XF	I*4	000000	IDYLSR	F C	I*4	0003E8	IFIRST	C	I*4	NR	ISCALE	C	I*4	NR
IUNITS	F C	I*4	000018	IYDSEQ	C	I*4	NR	NHSYRS	C	I*4	NR	NYRSIH	C	I*4	NR
RATOYR	C	I*4	NR	VARESY	F C	R*4	001F40	VDACES	FA C	R*4	000FA0	XMATRX	C	R*4	NR
YLDEST	F C	R*4	001770												

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * PARAM* SIZE OF BLOCK 0211F8 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NAS	I*4	000000	NHSYRS	I*4	000004 NR	NYRSIH	I*4	000008 NR	RATOYR	I*4	00000C NR
GAP	I*4	000010 NR	ISCALE	I*4	000014 NR	IUNITS	I*4	000018	ICROP	I*4	000158
JOIN	I*2	000298 NR	NARB	I*4	01EAE0 NR	ARBSET	I*2	01EAE4 NR	IOUT	I*4	0211F4 NR

NAME OF COMMON BLOCK * DATA* SIZE OF BLOCK 004E20 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
IDSR	I*4	000000	IDYLSR	I*4	0003E8	CLASS1	I*4	0007D0	DACES	R*4	000888
VDACES	R*4	000FA0	TAREA	R*4	001388 NR	YLDEST	R*4	001770	VARTY	R*4	001858
VARESY	R*4	001F40	HSACRE	R*4	00232B NR	HRATYR	R*4	004A38			

NAME OF COMMON BLOCK * EST* SIZE OF BLOCK 03ED80 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NGPRS	I*4	000000 NR	GROUP	I*4	000004	HMATRX	R*4	0003EC NR	BMATRX	R*4	0007D4 NR
GAMMA	R*4	0008BC NR	XMATRX	R*4	000FA4 NR	XQCI	R*4	03E034 NR	NUMYS	I*4	03E41C NR
IYDSEQ	I*4	03E420 NR	IFIRST	I*4	03E4E8 NR	IYD	I*4	03E5B0 NR	XD	R*4	03E998 NR

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
10	19	00044C	20	23	0004D4						

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	000310	100006	15	0003AA	100007	17	0003C0	100008	18	0003F6
100009	20	000454	100010	22	00046A	100011	24	0004DC			

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
900	25	000028	910	26	00004B	920	27	000061	1000	28	000090
1010	29	00017B	1020	30	000195	1030	31	000229			

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 31, PROGRAM SIZE = 1282, SUBPROGRAM NAME = STATS

```
*LEVEL 2.3.0 (JUNE 78)        STATS        OS/360  FORTRAN H EXTENDED        DATE 82.014/11.30.42        PAGE   4
*STATISTICS*  NO  DIAGNOSTICS GENERATED
****** END OF COMPILATION ******                                  221K BYTES OF CORE NOT USED
```

ORIGINAL PAGE IS
OF POOR QUALITY

REQUESTED OPTIONS:

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

```
ISN 0002            SUBROUTINE ZONEST                                                  ZON00010
                C-------------------------------------------------------------------CZON00020
                C                                                                     CZON00030
                C  S U B R O U T I N E                                                CZON00040
                C  -------------------                                                CZON00050
                C      ZONEST                                                         CZON00060
                C                                                                     CZON00070
                C  H I S T O R Y                                                      CZON00080
                C  -------------                                                      CZON00090
                C      PROGRAMMER ..... GARY W. SHAW ,LEMSCO ,5/15/81                 CZON00100
                C                                                                     CZON00110
                C  P U R P O S E                                                      CZON00120
                C  -------------                                                      CZON00130
                C      TO CALCULATE THE ZONE ESTIMATES.                               CZON00140
                C                                                                     CZON00150
                C  SUBROUTINES REQUIRED                                               CZON00160
                C  --------------------                                               CZON00170
                C     EST2                                                            CZON00180
                C                                                                     CZON00190
                C  R E M A R K S                                                      CZON00200
                C  -------------                                                      CZON00210
                C                                                                     CZON00220
                C-------------------------------------------------------------------CZON00230
ISN 0003            INTEGER  RATOYR ,GAP                                              ZON00240
ISN 0004            INTEGER*2  JOIN, ARBSET                                           ZON00250
ISN 0005            COMMON /PARAM/NAS          ,NHSYRS      ,NYRS1H      ,          ZON00260
                   #             RATOYR        ,GAP                      ,          ZON00270
                   #             ISCALE        ,IUNITS(80)  ,ICROP(80)   ,          ZON00280
                   #             JOIN(250,250) ,NARB        ,ARBSET(20,250),         ZON00290
                   #             IOU)                                               ZON00300
                C                                                                     ZON00310
ISN 0006            INTEGER  CLASS1                                                   ZON00320
ISN 0007            COMMON /DATA/ IDSR(250)    ,IDYLSR(250)                 ,        ZON00330
                   #             CLASS1(250)   ,                                    ZON00340
                   #             DACES(250)    ,VDACES(250) ,TAREA(250)    ,        ZON00350
                   #             YLDEST(250)   ,VARTY(250)  ,VARESY(250)   ,        ZON00360
                   #             HSACRE(250,10) ,HRATYR(250)                        ZON00370
                C-------------------------------------------------------------------CZON00380
                C       DIMENSIONS FOR LOCAL VARIABLES.                           CZON00390
                C-------------------------------------------------------------------CZON00400
ISN 0008            DIMENSION IMASK(250),   ITEMP(6)                                  ZON00410
ISN 0009            DATA     UDLINE/'    '/                                           ZON00420
                C************** S U B R O U T I N E  STARTS ************************CZON00430
ISN 0010            ICURZ = 1                                                         ZON00440
ISN 0011         10 CONTINUE                                                          ZON00450
                C-------------------------------------------------------------------CZON00460
                C          ICURZ   POINTER TO I_TH ZONE                           CZON00470
                C          IZONE   ID OF THE I_TH ZONE                            CZON00480
                C          IMASK   VECTOR OF ONES/ZEROS (1=ACREAGE STRATA IN ZONE)CZON00490
                C-------------------------------------------------------------------CZON00500
ISN 0012            IZONE = IDSR(ICURZ) / 1000                                        ZON00510
ISN 0013            DO 20 I = 1,NAS                                                   ZON00520
ISN 0014              IZ = IDSR(I) / 1000                                             ZON00530
ISN 0015              IMASK(I) = 0                                                    ZON00540
ISN 0016              IF (IZ.EQ.IZONE) IMASK(I) = 1                                   ZON00550
ISN 0018              IF (IZ.EQ.IZONE) ICURZ    = ICURZ + 1                           ZON00560
ISN 0020         20 CONTINUE                                                          ZON00570
                C                                                                     ZON00580
ISN 0021            CALL EST2(IMASK  ,A  ,AMSPE  ,P  ,PMSPE  )                        ZON00590
                C                                                                     ZON00600
                C-------------------------------------------------------------------CZON00610
                C       O U T P U T   FOR  I_TH  ZONE.                            CZON00620
                C-------------------------------------------------------------------CZON00630
ISN 0022            WRITE(6,900) IZONE                                                ZON00640
ISN 0023            WRITE(6,910)                                                      ZON00650
ISN 0024            IOUT6 = 0                                                         ZON00660
ISN 0025            DO 30 I = 1,NAS                                                   ZON00670
ISN 0026              IF (IOUT6.EQ.6) WRITE(6,920) (ITEMP(J), J =1,6)                 ZON00680
ISN 0028              IF (IOUT6.EQ.6) IOUT6 = 0                                       ZON00690
ISN 0030              IF (IMASK(I).EQ.1) IOUT6 = IOUT6 + 1                            ZON00700
ISN 0032              IF (IMASK(I).EQ.1) ITEMP(IOUT6) = IDSR(I)                       ZON00710
ISN 0034         30 CONTINUE                                                          ZON00720
ISN 0035            IF (IOUT6.GT.0) WRITE(6,920) (ITEMP(J), J = 1,IOUT6)            ZON00730
```

```
ISN 0037          WRITE(6,930) (UDLINE,I = 1,12)                                ZON00740
ISN 0038          ARMSPE = SQRT(AMSPE)                                          ZON00750
ISN 0039          PRMSPE = SQRT(PMSPE)                                          ZON00760
ISN 0040          WRITE(6,940)  A,AMSPE,ARMSPE,P,PMSPE,PRMSPE                   ZON00770
                C-------------------------------------------------------------C ZON00780
                C       ICURZ POINTS TO NEXT ZONE IN THE DATA SET (IF THERE IS ONE)  ZON00790
                C                                                             C ZON00800
                C       TEST TO SEE IF HAVE ANYOTHER ZONES TO PROCESS         C ZON00810
                C-------------------------------------------------------------C ZON00820
ISN 0041          IF (ICURZ.LE.NAS) GO TO 10                                    ZON00830
ISN 0043          RETURN                                                        ZON00840
                C-------------------------------------------------------------C ZON00850
ISN 0044        900 FORMAT('1',20X,'ESTIMATES FOR ZONE',1X,I3,'.')              ZON00860
ISN 0045        910 FORMAT(///,10X,                                             ZON00870
                #     'THIS ZONE INCLUDES THE FOLLOWING ACREAGE STRATA : ',//)  ZON00880
ISN 0046        920 FORMAT(10X,6(I5,3X))                                        ZON00890
ISN 0047        930 FORMAT(/,'+',7X,12A4)                                       ZON00900
ISN 0048        940 FORMAT(//,38X,'AREA ESTIMATE =',F18.4,                      ZON00910
                #       //,10X,'ESTIMATE OF MEAN SQUARED PREDICTION ERROR =',F18.4,ZON00920
                #       //,17X,'ROOT MEAN SQUARED PREDICTION ERROR =',F18.4,    ZON00930
                #      ////,32X,'PRODUCTION ESTIMATE =',F18.4,                  ZON00940
                #       //,10X,'ESTIMATE OF MEAN SQUARED PREDICTION ERROR =',F18.4,ZON00950
                #       //,17X,'ROOT MEAN SQUARED PREDICTION ERROR =',F18.4    ) ZON00960
ISN 0049          RETURN                                                        ZON00970
ISN 0050          END                                                           ZON00980
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL	STATEMENT NUMBERS								
A	0021	0040								
I	0013	0014	0015	0016	0025	0030	0032	0032	0037	0037
J	0026	0026	0026	0035	0035	0035				
P	0021	0040								
IZ	0014	0016	0018							
GAP	0003	0005								
NAS	0005	0013	0025	0041						
EST2	0021									
IDSR	0007	0012	0014	0032						
IOUT	0005									
JOIN	0004	0005								
NARB	0005									
SQRT	0038	0039								
AMSPE	0021	0038	0040							
DACES	0007									
ICROP	0005									
ICURZ	0010	0012	0018	0018	0041					
IMASK	0008	0015	0016	0021	0030	0032				
IOUT6	0024	0026	0028	0028	0030	0030	0032	0035	0035	
ITEMP	0008	0026	0032	0035						
IZONE	0012	0016	0018	0022						
PMSPE	0021	0039	0040							
TAREA	0007									
VARTY	0007									
ARBSET	0004	0005								
ARMSPE	0038	0040								
CLASS1	0006	0007								
HRATYR	0007									
HSACRE	0007									
IDYLSR	0007									
ISCALE	0005									
IUNITS	0005									
NHSYRS	0005									
NYRSIH	0005									
PRMSPE	0039	0040								
RATOYR	0003	0005								
UDLINE	0009	0037								
VARESY	0007									
VDACES	0007									
YLDEST	0007									
ZONEST	0002									

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES
10	0011	0041
20	0020	0011
30	0034	0025
900	0044	0022

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES
910	0045	0023
920	0046	0026 0035
930	0047	0037
940	0048	0040

/ ZONEST / SIZE OF PROGRAM 0008D2 HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
A	SFA	R*4	00022C	I	SF	I*4	000230	J	F	I*4	000234	P	SFA	R*4	000238
IZ	S	I*4	00023C	GAP	C	I*4	NR	NAS	F C	I*4	000000	EST2	SF XF		000000
IDSR	F C	I*4	000000	IOUT	C	I*4	NR	JOIN	C	I*2	NR	NARB	C	I*4	NR
SQRT	F XF	R*4	000000	AMSPE	SFA	R*4	000240	DACES	C	R*4	NR	ICROP	C	I*4	NR
ICURZ	SF	I*4	000244	IMASK	SFA	I*4	000264	IOUT6	SF	I*4	000248	ITEMP	SF	I*4	00064C
IZONE	SF	I*4	00024C	PMSPE	SFA	R*4	000250	TAREA	C	R*4	NR	VARTY	C	R*4	NR
ARBSET	C	I*2	NR	ARMSPE	SF	R*4	000254	CLASS1	C	I*4	NR	HRATYR	C	R*4	NR
HSACRE	C	R*4	NR	IBCOMM	F XF	R*4	000000	IDYLSR	C	I*4	NR	ISCALE	C	I*4	NR
IUNITS	C	I*4	NR	NHSYRS	C	I*4	NR	NYRS1H	C	I*4	NR	PRMSPE	SF	R*4	000258
RATOYR	C	I*4	NR	UDLINE	F	R*4	00025C	VARESY	C	R*4	NR	VDACES	C	R*4	NR
YLDEST	C	R*4	NR	ZONEST		R*4	000260								

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * PARAM* SIZE OF BLOCK 0211F8 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
NAS	I*4	000000	NHSYRS	I*4	000004 NR	NYRS1H	I*4	000008 NR	RATOYR	I*4	00000C NR
GAP	I*4	000010 NR	ISCALE	I*4	000014 NR	IUNITS	I*4	000018 NR	ICROP	I*4	000158 NR
JOIN	I*2	000298 NR	NARB	I*4	01EAE0 NR	ARBSET	I*2	01EAE4 NR	IOUT	I*4	0211F4 NR

NAME OF COMMON BLOCK * DATA* SIZE OF BLOCK 004E20 HEXADECIMAL BYTES

VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.	VAR. NAME	TYPE	REL. ADDR.
IDSR	I*4	000000	IDYLSR	I*4	0003E8 NR	CLASS1	I*4	0007D0 NR	DACES	R*4	000BB8 NR
VDACES	R*4	000FA0 NR	TAREA	R*4	001388 NR	YLDEST	R*4	001770 NR	VARTY	R*4	001B58 NR
VARESY	R*4	001F40 NR	HSACRE	R*4	002328 NR	HRATYR	R*4	004A38 NR			

SOURCE STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
10	11	0006B2	20	20	00070A	30	34	0007D0			

COMPILER GENERATED LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
100001	2	000694	100002	14	0006CA	100003	17	0006F2	100004	18	0006FC
100005	19	000708	100006	21	000714	100007	26	000756	100008	27	00075E
100011	28	000788	100012	29	000790	100013	30	000794	100014	31	0007A2
100015	32	0007AC	100016	33	0007BA	100017	35	0007DA	100018	36	0007E4
100021	37	000814	100024	43	0008A4						

FORMAT STATEMENT LABELS

LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR	LABEL	ISN	ADDR
900	44	000628	910	45	00004A	920	46	000087	930	47	000092
940	48	00009E									

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 49, PROGRAM SIZE = 2258, SUBPROGRAM NAME =ZONEST

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 217K BYTES OF CORE NOT USED

REQUESTED OPTIONS:

OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)
SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

```
ISN 0002          SUBROUTINE ZSORT                                              ZS000010
                 I          ( NORECS, NHSYRS)                                  ZS000020
                C-------------------------------------------------------------CZS000030
                CCC                                                           CZS000040
                CCC  S U B R O U T I N E                                      CZS000050
                CCC  -------------------                                      CZS000060
                CCC      ZSORT                                                CZS000070
                CCC                                                           CZS000080
                CCC  H I S T O R Y                                            CZS000090
                CCC  -------------                                            CZS000100
                CCC      PROGRAMMER ............... GARY W. SHAW ,LEMSCO ,6/23/81 CZS000110
                CCC                                                           CZS000120
                CCC  P U R P O S E                                            CZS000130
                CCC  -------------                                            CZS000140
                CCC      TO REARRANGE THE DATA OF THE COMMON /DATA/ SO TO HAVE THE CZS000150
                CCC  ACREAGE STRATA OF EACH ZONE TOGETHER .                   CZS000160
                CCC                                                           CZS000170
                CCC  SUBROUTINES REQUIRED                                     CZS000180
                CCC  --------------------                                     CZS000190
                CCC    NONE                                                   CZS000200
                CCC                                                           CZS000210
                C-------------------------------------------------------------CZS000220
ISN 0003          INTEGER  CLASS                                              ZS000230
ISN 0004          COMMON /DATA/ IDSR(250)      ,IDYLSR(250)                   ZS000240
                 #              CLASS1(250)     ,                              ZS000250
                 #              DACES(250)      ,VDACES(250) ,TAREA(250)       ZS000260
                 #              YLDEST(250)     ,VARTY(250)  ,VARESY(250)      ZS000270
                 #              HSACRE(250,10) ,HRATYR(250)                   ZS000280
                C*************************************************************CZS000290
                C   DIMENSIONS FOR LOCAL VARIABLES                            CZS000300
                C-------------------------------------------------------------CZS000310
ISN 0005          DIMENSION HSAVE(10)                                         ZS000320
ISN 0006          ICUR = 0                                                    ZS000330
ISN 0007          DO 20 I = 1,NORECS                                          ZS000340
ISN 0008             ICUR = ICUR + 1                                          ZS000350
ISN 0009             ICUR1 = ICUR + 1                                         ZS000360
ISN 0010             IF (ICUR1.GT.NORECS) GO TO 21                            ZS000370
ISN 0012             ITOP = IDSR(ICUR) / 1000                                 ZS000380
ISN 0013             INEXT = IDSR(ICUR1) / 1000                               ZS000390
ISN 0014             IF (INEXT.EQ.ITOP) GO TO 20                              ZS000400
ISN 0016             JMIN = ICUR1                                             ZS000410
ISN 0017             IF (JMIN.GE.NORECS)  GO TO 20                            ZS000420
ISN 0019             DO 10 J = JMIN,NORECS                                    ZS000430
ISN 0020               ICHECK = IDSR(J) /1000                                 ZS000440
ISN 0021               IF (ICHECK.NE.ITOP) GO TO 10                           ZS000450
                CCC                                                           ZS000460
                CCC       EXCHANGES                                           ZS000470
                CCC                                                           ZS000480
ISN 0023                  ICUR = ICUR + 1                                     ZS000490
ISN 0024                  ISAVE1    = IDSR(ICUR)                              ZS000500
ISN 0025                  ISAVE2    = IDYLSR(ICUR)                            ZS000510
ISN 0026                  ISAVE3    = CLASS1(ICUR)                            ZS000520
ISN 0027                  SAVE4     = DACES(ICUR)                             ZS000530
ISN 0028                  SAVE5     = VDACES(ICUR)                            ZS000540
ISN 0029                  SAVE6     = TAREA(ICUR)                             ZS000550
ISN 0030                  SAVE7     = YLDEST(ICUR)                            ZS000560
ISN 0031                  SAVE8     = VARTY(ICUR)                             ZS000570
ISN 0032                  SAVE9     = VARESY(ICUR)                            ZS000580
ISN 0033                  DO  7 IH = 1,NHSYRS                                 ZS000590
ISN 0034                    HSAVE(IH) = HSACRE(ICUR,IH)                       ZS000600
ISN 0035        7         CONTINUE                                            ZS000610
                C                                                             ZS000620
ISN 0036                  IDSR(ICUR)     = IDSR(J)                          ZS000630
ISN 0037                  IDYLSR(ICUR)   = IDYLSR(J)                        ZS000640
ISN 0038                  CLASS1(ICUR)   = CLASS1(J)                        ZS000650
ISN 0039                  DACES(ICUR)    = DACES(J)                         ZS000660
ISN 0040                  VDACES(ICUR)   = VDACES(J)                        ZS000670
ISN 0041                  TAREA(ICUR)    = TAREA(J)                         ZS000680
ISN 0042                  YLDEST(ICUR)   = YLDEST(J)                        ZS000690
ISN 0043                  VARTY(ICUR)    = VARTY(J)                         ZS000700
ISN 0044                  VARESY(ICUR)   = VARESY(J)                        ZS000710
ISN 0045                  DO  8 IH = 1,NHSYRS                               ZS000720
ISN 0046                    HSACRE(ICUR,IH) = HSACRE(J,IH)                  ZS000730
```

```
   ISN 0047          8        CONTINUE                                                    ZS000740
                     C                                                                    ZS000750
   ISN 0048                   IDSR(J)      = ISAVE1                                     ZS000760
   ISN 0049                   IDYLSR(J)    = ISAVE2                                     ZS000770
   ISN 0050                   CLASS1(J)    = ISAVE3                                     ZS000780
   ISN 0051                   DACES(J)     = SAVE4                                      ZS000790
   ISN 0052                   VDACES(J)    = SAVE5                                      ZS000800
   ISN 0053                   TAREA(J)     = SAVE6                                      ZS000810
   ISN 0054                   YLDEST(J)    = SAVE7                                      ZS000820
   ISN 0055                   VARTY(J)     = SAVE8                                      ZS000830
   ISN 0056                   VARESY(J)    = SAVE9                                      ZS000840
   ISN 0057                   DO  9 IH = 1,NHSYRS                                       ZS000850
   ISN 0058                     HSACRE(J,IH) = HSAVE(IH)                                ZS000860
   ISN 0059          9        CONTINUE                                                    ZS000870
                     C                                                                    ZS000880
   ISN 0060         10     CONTINUE                                                      ZS000890
   ISN 0061         20  CONTINUE                                                        ZS000900
   ISN 0062         21  CONTINUE                                                        ZS000910
   ISN 0063             RETURN                                                          ZS000920
   ISN 0064             END                                                             ZS000930
```

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

SYMBOL	INTERNAL STATEMENT NUMBERS																			
I	0007																			
J	0019	0020	0036	0037	0038	0039	0040	0041	0042	0043	0044	0046	0048	0049	0050	0051	0052	0053	0054	
	0055	0056	0058																	
IH	0033	0034	0034	0045	0046	0046	0057	0058	0058											
ICUR	0006	0008	0008	0009	0012	0023	0023	0024	0025	0026	0027	0028	0029	0030	0031	0032	0034	0036	0037	
	0038	0039	0040	0041	0042	0043	0044	0046												
IDSR	0004	0012	0013	0020	0024	0036	0036	0048												
ITOP	0012	0014	0021																	
JMIN	0016	0017	0019																	
DACES	0004	0027	0039	0039	0051															
HSAVE	0005	0034	0058																	
ICUR1	0009	0010	0013	0016																
INEXT	0013	0014																		
SAVE4	0027	0051																		
SAVE5	0028	0052																		
SAVE6	0029	0053																		
SAVE7	0030	0054																		
SAVE8	0031	0055																		
SAVE9	0032	0056																		
TAREA	0004	0029	0041	0041	0053															
VARTY	0004	0031	0043	0043	0055															
ZSORT	0002																			
CLASS1	0003	0004	0026	0038	0038	0050														
HRATYR	0004																			
HSACRE	0004	0034	0046	0046	0058															
ICHECK	0020	0021																		
IDYLSR	0004	0025	0037	0037	0049															
ISAVE1	0024	0048																		
ISAVE2	0025	0049																		
ISAVE3	0026	0050																		
NHSYRS	0002	0033	0045	0057																
NORECS	0002	0007	0010	0017	0019															
VARESY	0004	0032	0044	0044	0056															
VDACES	0004	0028	0040	0040	0052															
YLDEST	0004	0030	0042	0042	0054															

*****F O R T R A N C R O S S R E F E R E N C E L I S T I N G*****

LABEL	DEFINED	REFERENCES		
7	0035	0033		
8	0047	0045		
9	0059	0057		
10	0060	0019	0021	
20	0061	0007	0014	0017
21	0062	0010		

/ ZSORT / SIZE OF PROGRAM 00047A HEXADECIMAL BYTES

NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.	NAME	TAG	TYPE	ADD.
I	SF	I*4	00008C	J	SF	I*4	000090	IH	SF	I*4	000094	ICUR	SF	I*4	000098
IDSR	SF C	I*4	000000	ITOP	S	I*4	00009C	JMIN	SF	I*4	0000A0	DACES	SF C	R*4	0000B8
HSAVE	SF	R*4	0000E0	ICUR1	SF	I*4	0000A4	INEXT	S	I*4	0000A8	SAVE4	SF	R*4	0000AC
SAVE5	SF	R*4	000080	SAVE6	SF	R*4	000084	SAVE7	SF	R*4	000088	SAVE8	SF	R*4	00008C

```
   SAVE9 SF       R*4   0000C0    TAREA SF   C   R*4   001388    VARTY SF   C   R*4   001858    ZSORT          R*4   0000C4
  CLASS1 SF   C   I*4   0007D0   HRATYR         C   R*4     NR    HSACRE SF   C   R*4   002328   ICHECK S        I*4   0000C8
  IDYLSR SF   C   I*4   0003E8   ISAVE1 SF          I*4   0000CC   ISAVE2 SF       I*4   0000D0   ISAVE3 SF      I*4   0000D4
  NHSYRS  F       I*4   0000D8   NORECS  F          I*4   0000DC   VARESY SF   C   R*4   001F40   VDACES SF   C  R*4   000FA0
  YLDEST SF   C   R*4   001770
```

***** COMMON INFORMATION *****

NAME OF COMMON BLOCK * DATA* SIZE OF BLOCK 004E20 HEXADECIMAL BYTES

```
VAR. NAME  TYPE  REL. ADDR.   VAR. NAME  TYPE  REL. ADDR.   VAR. NAME  TYPE  REL. ADDR.   VAR. NAME  TYPE  REL. ADDR.
    IDSR   I*4     000000       IDYLSR   I*4     0003E8       CLASS1   I*4     0007D0       DACES    R*4     000000
  VDACES   R*4     000FA0        TAREA   R*4     001388       YLDEST   R*4     001770       VARTY    R*4     001858
  VARESY   R*4     001F40       HSACRE   R*4     002328       HRATYR   R*4   004A38 NR
```

SOURCE STATEMENT LABELS

```
LABEL  ISN  ADDR      LABEL  ISN  ADDR      LABEL  ISN  ADDR      LABEL  ISN  ADDR
    7   35  000252       8   47  00034E       9   59  000404      10   68  000410
   20   61  000424      21   62  000438
```

COMPILER GENERATED LABELS

```
LABEL   ISN  ADDR      LABEL   ISN  ADDR      LABEL   ISN  ADDR      LABEL   ISN  ADDR
100001    2  00011C   100002    8  000140   100003   12  000156   100004   16  000188
100005   19  000194   100006   20  000198   100007   23  0001B8   100008   34  000236
100009   36  00025E   100010   46  000328   100011   48  00035A   100012   58  0003E6
```

*OPTIONS IN EFFECT*NAME(MAIN) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTODBL(NONE)

*OPTIONS IN EFFECT*SOURCE EBCDIC NOLIST NODECK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF TERM IBM FLAG(I)

STATISTICS SOURCE STATEMENTS = 63, PROGRAM SIZE = 1146, SUBPROGRAM NAME = ZSORT

STATISTICS NO DIAGNOSTICS GENERATED

****** END OF COMPILATION ****** 217K BYTES OF CORE NOT USED

APPENDIX C

SYSTEM STOPS

In general the GOAT system stops are for error conditions such as faulty input files, zero divides, DO variable out of range, etc. Each system stop is defined below. The stop numbers generated has a general format of:

XXYYYY

where

XX is an assigned number to each of the subroutines

and

YYY is the nearest numbered label within the given subroutine.

The subroutines of the GOAT system have been assigned the following prefatory numbers, XX:

Subroutine	Prefatory Number
GOAT (MAIN)	10
READFL	10
RDATA	10
GRPING	20
AVOPT	30
FIND2	40
HGAMMA	50
PREST	60
STATS	70
ZONEST	80
REGION	90
ARB	10
EST2	12

The following is a list of system stop numbers and their description:

Stop Number	Description
10001	Error in reading the inputs files.
10110	The number of records in the input data file was found to be greater than 250.
10400	The index of the historical year used as the ratio year was found to be less than or equal to zero.

Stop Number	Description
10401	The number for the ratio historical year was found to be greater than the total number of input historical years.
10440	The JOIN matrix was found to be asymmetric after the matrix was read in.
10999	Error was found in reading the input file containing the values for the parameter common block.
10010	The number of historical acreage years was found to be greater than 10.
10015	The number of records in the data file was found to be less than or equal to zero.
20056	An isolated Class II acreage stratum was left over in the searching of Class II's in the grouping procedure.
20057	An activity indicator of a Class II acreage stratum was found to be in error.
20089	The DO Loop 89 maximum index range was found to be less than or equal to zero.
20100	Two Class II acreage strata were to be combined.
20101	The JOIN matrix was found to be asymmetric.
20160	A check if all Class I acreage strata to be active and all Class II to be combined has failed.

Stop Number	Description
20219	The DO Loop 219 maximum range was found to be less than or equal to zero.
20220	A Class I acreage stratum was to be combined with another group, but was not accomplished. This may be caused by the structure of the join matrix or because of the ratio of variances found.
20251	After the JOIN matrix was changed, it was found to be asymmetric.
20330	The activity array for the final steps of the grouping procedure was found to be incorrect.
30001	The number of acreage strata in a group was found to be less than or equal to zero.
30010	The DO Loop 10 maximum index range was found to be less than or equal to zero.
30020	Conditions for a zero divide occurred (BOT)*.
30021	Conditions for a zero divide occurred (GAP).
30022	The DO Loop 30 maximum index range was found to be less than or equal to one (it should be 2 or more).
30030	Conditions for a zero divide occurred (BVAR).
30050	Conditions for a zero divide occurred (BMATRX).
30061	Conditions for a zero divide occurred. (BD3).

*The words in parentheses are the variable names in the appropriate subroutine.

Stop Number	Description
30070	Conditions for a zero divide occurred (BMATRX).
30071	Conditions for a zero divide occurred (EHIS).
50001	The number of years of historical acreage data was found to be less than 2.
50010	Conditions for a zero divide occurred (TAREA).
50011	Conditions for a zero divide occurred (BOT).
50012	Conditions for a zero divide occurred (HPMAX).
50025	Conditions for a zero divide occurred (E).
50026	Conditions for a zero divide occurred (HISGAM).
50027	Conditions for a zero divide occurred (DEM).
50090	Conditions for a zero divide occurred (BOT).
50095	Conditions for a zero divide occurred (TAREA).
50096	Conditions for a zero divide occurred (HISGAM).
50097	Conditions for a zero divide occurred (TAREA).
50098	Equation 5, section 3.3, was not satisfied using the estimated gammas found.
60051	The number of groups was found to be less than or equal to zero.

Stop Number	Description
60080	The index for an array was found to be out of range.
60081	Conditions for a zero divide occurred (INGAYS).
60082	Conditions for a zero divide occurred (VARESY).
60084	The index for an array was found to be out of range.
60085	Conditions for a zero divide occurred (VARESY).
60086	Conditions for a zero divide occurred (ONEPNG).
60090	Conditions for a zero divide occurred (BMATRX).
60100	Conditions for a zero divide occurred (BMATRX).
60110	Conditions for a zero divide occurred (HBH).
60111	Conditions for a zero divide occurred (BMATRX).
60120	Conditions for a zero divide occurred (ROT).
60230	Conditions for a zero divide occurred (HRATYR).
12030	Conditions for a zero divide occurred (BMATRX).
12040	Conditions for a zero divide occurred (XOC1).
12041	Conditions for a zero divide occurred (BMATRX).
12109	The index for an array was found to be out of range.

APPENDIX D

EXAMPLE RUNS

EXAMPLE RUNS

As explained in section 3.5.2, there is optional diagnostic output. This appendix gives three example runs with three different options given for the type of diagnostic output, as well as three different sets of input files.

```
FILE: CONSOLE  FILE     A   EODL / JOHNSON SPACE CENTER                    PAGE 001

R; T=0.01/0.02 13:39:55N
GOAT
 NO  FILES CHANGED

      ( TO TERMINATE THIS SESSION, HERE OR AT ANY SUCCEEDING
        QUESTIONS, ENTER   HX    .)

      FOR THE CONTROL CARD FILE ENTER:  FILE-NAME   FILE-TYPE   (FILE-MO
TEST CC G
CONTROL CARD FILE TO BE USED IS: TEST CC G

      FOR THE DATA FILE ENTER:  FILE-NAME  FILE-TYPE  (FILE-MODE)
TEST DATA G
DATA FILE TO BE USED IS: TEST DATA G

      DO YOU WANT BATCH OR INTERACTIVE?     E N T E R : BAT/INTER
  DMTSML147I SENT FILE 0485 (0485) ON LINK HOUSTON TO HOUSTON SYSTEM
INTER

      DO YOU WANT THE OUTPUT ON A CMS DISK FILE OR SENT TO THE
      PRINTER?  ENTER   FILE/PRT
FILE

    FOR THE CMS DISK FILE ENTER:  FILE-NAME   FILE-TYPE   (FILE-MODE)
GOAT OUTPUT B
OUTPUT IS ON DISK FILE: GOAT OUTPUT B
EXECUTION BEGINS...
  DMTSML147I SENT FILE 0487 (0487) ON LINK HOUSTON TO HOUSTON SYSTEM
CONSOLE FILE IS READ ONTO YOUR A DISK AS: CONSOLE FILE A.
```

EXAMPLE USING TEST CC

```
 INPUT SUMMARY
 CHECK OUT   0
 AREA ST     14
 HIST YRS    8
 RATIO YR    7
 HMATRIX YR  8
 GAP         1
 OPTION SET  0
 SCALE       1000
 CROP        SPRING SMALL GRAINS
 JOIN        21001,21002,21006,21010
 JOIN        21002,21001,21006
 JOIN        19003,19004,19007
 JOIN        19004,19003,19007
 JOIN        20005,20009
 JOIN        21006,21001,21002,21010,21011,21012,21013
 JOIN        19007,19003,19004,19008
 JOIN        19008,19007,19014
 JOIN        20009,20005
 JOIN        21010,21001,21006,21011
 JOIN        21011,21006,21010,21012
 JOIN        21012,21006,21011,21013
 JOIN        21013,21006,21012
 JOIN        19014,19008
 UNITS       AREA: ACRES IN 1000'S    YIELD: BUSHELS/ACRE
 COMMENT     21001,21002,21006,21010,21011,21012,21013
 COMMENT     19014,19008
 COMMENT     19003,19004,19007
 COMMENT     20005,20009
 COMMENTS    GOAT AGGREGATION FOR ND SEGMENT DATA
 COMMENTS    DATABASE USED: SASBASE.NDGROUPS    VARIABLES USED: SYCPE79 , SYCPV79
 COMMENTS    THE USDA SSG ACREAGES FOR 1978 WERE USED FOR RATIOING
1                          D A T A   S U M M A R Y

 THE CROP IS: SPRING SMALL GRAINS
 THE UNITS FOR AREA AND PRODUCTION ARE:AREA: ACRES IN 1000'S    YIELD: BUSHELS/ACRE
```

APFA STRATA	DIRECT APFA ESTIMATE	VARIANCE DIRECT AREA ESTIMATE	COEFFICIENT OF VARIATION DIRECT AREA ESTIMATE (PERCENT)	HISTORICAL AREA FOR RATIO YEAR
21001	717.05	117819.50	47.9	761.40
21002	1170.02	51420.30	19.4	998.30
21006	821.45	83004.37	35.1	1013.40
21010	-1.00	-1.00	0.0	127.90
21011	-1.00	-1.00	0.0	838.00
21012	563.38	33652.20	32.6	448.60
21013	645.55	87856.62	45.9	1085.00
19014	870.40	22173.20	17.1	873.80
19003	1216.64	79095.62	23.1	1437.20
19004	1187.72	20915.60	12.2	1191.00
19007	840.02	81413.69	34.0	1103.70
19008	1114.37	56396.20	21.3	1152.60
20005	1162.37	64240.40	21.8	1135.30
20009	1426.22	97124.87	21.9	1363.80

1

AREA STRATA	YIELD STRATA	YIELD ESTIMATE	VARIANCE OF TRUE YIELD	VARIANCE OF ESTIMATED YIELD	GROUP
21001	3R	1.000	0.00	0.00	1
21002	3R	1.000	0.00	0.00	1
21006	3R	1.000	0.00	0.00	1
21010	3R	1.000	0.00	0.00	1
21011	3R	1.000	0.00	0.00	1
21012	3R	1.000	0.00	0.00	1
21013	3R	1.000	0.00	0.00	1
19014	3R	1.000	0.00	0.00	2
19003	3R	1.000	0.00	0.00	3

19004	3A	1.000	0.00	0.00	3
19007	3A	1.000	0.00	0.00	3
19008	3A	1.000	0.00	0.00	2
20005	3A	1.000	0.00	0.00	4
20009	3A	1.000	0.00	0.00	4

1 ESTIMATES FOR ZONE 21.

THIS ZONE INCLUDES THE FOLLOWING ACREAGE STRATA :

21001 21002 21006 21010 21011 21012
21013

AREA ESTIMATE = 4966.2344
ESTIMATE OF MEAN SQUARED PREDICTION ERROR = 499764.500
ROOT MEAN SQUARED PREDICTION ERROR = 706.9402

PRODUCTION ESTIMATE = 4966.2383
ESTIMATE OF MEAN SQUARED PREDICTION ERROR = 499764.562
ROOT MEAN SQUARED PREDICTION ERROR = 706.9402

1 ESTIMATES FOR ZONE 19.

THIS ZONE INCLUDES THE FOLLOWING ACREAGE STRATA :

19014 19003 19004 19007 19008

AREA ESTIMATE = 5444.2344
ESTIMATE OF MEAN SQUARED PREDICTION ERROR = 202738.062
ROOT MEAN SQUARED PREDICTION ERROR = 450.2644

PRODUCTION ESTIMATE = 5444.2383
ESTIMATE OF MEAN SQUARED PREDICTION ERROR = 202738.125
ROOT MEAN SQUARED PREDICTION ERROR = 450.2644

1 ESTIMATES FOR ZONE 20.

THIS ZONE INCLUDES THE FOLLOWING ACREAGE STRATA :

20005 20009

AREA ESTIMATE = 2585.6494
ESTIMATE OF MEAN SQUARED PREDICTION ERROR = 159403.125
ROOT MEAN SQUARED PREDICTION ERROR = 399.2532

PRODUCTION ESTIMATE = 2585.6509
ESTIMATE OF MEAN SQUARED PREDICTION ERROR = 159403.187

ROOT MEAN SQUARED PREDICTION ERROR = 399.2532

1 E S T I M A T E S FOR REGION

THE REGION INCLUDES THE FOLLOWING ACREAGE STRATA :

21001	21002	21006	21010	21011	21012
21013	19014	19003	19004	19007	19008
20005	20009				

AREA ESTIMATE =	12996.1055
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	861905.750
ROOT MEAN SQUARED PREDICTION ERROR =	928.3887
PRODUCTION ESTIMATE =	12996.1211
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	861905.937
ROOT MEAN SQUARED PREDICTION ERROR =	928.3889

```
FILE: CONSOLE  FILE     A   EODL / JOHNSON SPACE CENTER                    PAGE 001

R; T=0.01/0.02 13:37:41N
L * DATA G
AL12
LVTEST
TEST
VCHECK
R; T=0.04/0.07 13:37:51N
L * CC G
AL12
TEST
VCHECK
R; T=0.04/0.05 13:38:01N
GOATN
 NO  FILES CHANGED

      ( TO TERMINATE THIS SESSION, HERE OR AT ANY SUCCEEDING
        QUESTIONS, ENTER   HX    .)

      FOR THE CONTROL CARD FILE ENTER:  FILE-NAME   FILE-TYPE   (FILE-MO
ERROR IN EXEC FILE GOAT, LINE 41 - INVALID FORM OF CONDITION
R(00808); T=0.04/0.14 13:38:31N
GOAT
 NO  FILES CHANGED

      ( TO TERMINATE THIS SESSION, HERE OR AT ANY SUCCEEDING
        QUESTIONS, ENTER   HX    .)

      FOR THE CONTROL CARD FILE ENTER:  FILE-NAME   FILE-TYPE   (FILE-MO
AL12 CC G
CONTROL CARD FILE TO BE USED IS: AL12 CC G

      FOR THE DATA FILE ENTER:  FILE-NAME  FILE-TYPE  (FILE-MODE)
AL12 DATA G
DATA FILE TO BE USED IS: AL12 DATA G

      DO YOU WANT BATCH OR INTERACTIVE?     E N T E R : BAT/INTER
INTER

      DO YOU WANT THE OUTPUT ON A CMS DISK FILE OR SENT TO THE
      PRINTER?  ENTER   FILE/PRT
PRT
EXECUTION BEGINS...
6F
 NO. OF OPTIONAL SETS IN CONTROL CARD FILE:  2
 DOES NOT EQUAL NO. OF PZONES COUNTED:  4
 PROGRAM USES THE LATTER.
 JOIN MATRIX IS NOT SYMMETRIC AT  5-TH ROW AND  8-TH COLUMN
```

EXAMPLE USING AL12 CC

```
INPUT SUMMARY
CHECK OUT     4
AREA ST       12
HIST YRS      7
RATIO YR      6
HMATRIX YR    5
GAP           4
OPTION SET    2
SCALE         1000
CROP          CORN
JOIN         17001, 17002, 17003 ,17004 ,19003
JOIN         17002, 17001, 17003, 19002
JOIN         17003, 17001, 17002, 18002
JOIN         17004, 17001, 18004
JOIN         18001, 18002, 18004 ,18005
JOIN         18002, 17003, 18001
JOIN         18003, 18004, 18005
JOIN         18004, 17004, 18003
JOIN         18005, 18001, 18003
JOIN         19001, 19002, 19003
JOIN         19002, 17002, 19001, 19003
JOIN         19003, 17001, 19001, 19002
UNITS         ACRES AND BUSHELS
COMMENT       THIS TEST DATA SET HAS 4 ACREAGE STRATA AND TWO JOIN STATE-
COMMENT       MENTS AND THE NUMBER OF HISTORICAL YEARS IS 7 FOR THE CROP
COMMENT       CORN AND THE UNITS FOR AREA IS ACREAGE AND FOR PRODUCTION IT
COMMENT       IS IN BUSHELS.
COMMMENT        17001,17002,17003,17004,18001,18002,18003,18004,18005,&
     COMM                 19001,19003
COMMMENT        19002
PZONE          17001,18001,18005
PZONE          17002,18002,19001
PZONE          17003,18003,19002
PZONE          17004,18004,19003
NO. OF OPTIONAL SETS IN CONTROL CARD FILE:  2
DOES NOT EQUAL NO. OF PZONES COUNTED:  4
PROGRAM USES THE LATTER.
JOIN MATRIX IS NOT SYMMETRIC AT  5-TH ROW AND  8-TH COLUMN
CORRECTION:BOTH ELEMENTS SET TO 1.
```

AREA STRATA	DIRECT AREA ESTIMATE	HISTORICAL AREA	GROUP	GAMMA	H MATRIX
17001	1750.00	5320.87	1	0.999122	30198.926
17002	2114.42	496.10	1	0.999122	3345.025
17003	1516.25	1490.17	1	0.999122	9486.324
17004	1033.10	2642.95	1	0.999122	21050.898
18001	1903.10	3153.34	1	0.999122	21693.895
18002	2340.78	899.51	1	0.999122	5877.910
18003	1997.92	163.51	1	0.999122	1427.498
18004	2042.92	907.95	1	0.999122	6899.062
18005	1370.76	182.94	1	0.999122	1565.621
19001	3077.52	2493.27	1	0.999122	13358.449
19002	1862.87	6682.03	2	0.726639	0.0
19003	2044.43	3531.29	1	0.999122	24765.355

X OPTIMAL WEIGHTING MATRIX

0.15088	0.07116	0.09249	0.17305	0.08752	0.07086	0.78158	0.17699	0.01984	1.18692	0.0	0.08306
0.01292	0.00733	0.00896	0.02112	0.00893	0.00685	0.09918	0.02002	0.00253	0.10099	0.0	0.00939
0.04134	0.02048	0.02617	0.05242	0.02513	0.02004	0.23977	0.05236	0.00609	0.32472	0.0	0.02457
0.07431	0.03573	0.04613	0.08872	0.04390	0.03533	0.40282	0.08987	0.01023	0.58419	0.0	0.04217
0.08952	0.04211	0.05478	0.10211	0.05180	0.04197	0.46087	0.10458	0.01170	0.70427	0.0	0.04908
0.02507	0.01229	0.01577	0.03114	0.01509	0.01207	0.14209	0.03125	0.00361	0.19699	0.0	0.01467
0.00414	0.00261	0.00309	0.00809	0.00317	0.00236	0.03855	0.00744	0.00098	0.03223	0.0	0.00349
0.02531	0.01240	0.01591	0.03141	0.01523	0.01218	0.14328	0.03153	0.00364	0.19889	0.0	0.01479
0.00458	0.00281	0.00336	0.00858	0.00342	0.00257	0.04074	0.00794	0.00104	0.03571	0.0	0.00373
0.06999	0.03377	0.04355	0.08420	0.04149	0.03336	0.38264	0.08513	0.00972	0.55013	0.0	0.03995
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.00000	0.0
0.09967	0.04751	0.06152	0.11688	0.05840	0.04713	0.52946	0.11890	0.01344	0.78376	0.0	0.05580

DATA SUMMARY

THE CROP IS: CORN
THE UNITS FOR AREA AND PRODUCTION ARE: ACRES AND BUSHELS

AREA STRATA	DIRECT AREA ESTIMATE	VARIANCE DIRECT AREA ESTIMATE	COEFFICIENT OF VARIATION DIRECT AREA ESTIMATE (PERCENT)	HISTORICAL AREA FOR RATIO YEAR
17001	1750.00	194201.19	25.2	5320.87
17002	2114.42	41876.90	9.7	496.10
17003	1516.25	94315.81	20.3	1490.17
17004	1033.10	80167.31	27.4	2642.95
18001	1903.10	211782.62	24.2	3153.34
18002	2360.78	75889.12	11.7	899.51
18003	1997.92	0.70	0.0	167.51
18004	2042.92	26756.20	8.0	907.95
18005	1370.76	59927.50	17.9	182.94
19001	3077.52	0.40	0.0	2493.27
19002	1862.87	255205.87	27.1	6682.03
19003	2044.43	254160.37	24.7	3531.29

AREA STRATA	YIELD STRATA	YIELD ESTIMATE	VARIANCE OF TRUE YIELD	VARIANCE OF ESTIMATED YIELD	GROUP
17001	117	111.000	0.01	17.98	1
17002	117	111.000	0.01	17.98	1
17003	117	111.000	0.01	17.98	1
17004	117	111.000	0.01	17.98	1
18001	118	107.900	0.01	27.29	1
18002	118	107.900	0.01	27.29	1
18003	118	107.900	0.01	27.29	1
18004	118	107.900	0.01	27.29	1
18005	118	107.900	0.01	27.29	1
19001	119	116.900	0.01	36.62	1
19002	119	116.900	0.01	36.62	2
19003	119	116.900	0.01	36.62	1

ORIGINAL PAGE IS
OF POOR QUALITY

ESTIMATES FOR ZONE 17.

THIS ZONE INCLUDES THE FOLLOWING ACREAGE STRATA :

17001 17002 17003 17004

AREA ESTIMATE =	11614.1367
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	141888.937
ROOT MEAN SQUARED PREDICTION ERROR =	376.6814
PRODUCTION ESTIMATE =	1430636.00
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	3608621060.
ROOT MEAN SQUARED PREDICTION ERROR =	60071.8008

ESTIMATES FOR ZONE 18.

THIS ZONE INCLUDES THE FOLLOWING ACREAGE STRATA :

18001 18002 18003 18004 18005

AREA ESTIMATE =	8665.2539
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	57611.1797
ROOT MEAN SQUARED PREDICTION ERROR =	240.0233
PRODUCTION ESTIMATE =	744433.437
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	1490415360.
ROOT MEAN SQUARED PREDICTION ERROR =	38605.8984

ESTIMATES FOR ZONE 19.

THIS ZONE INCLUDES THE FOLLOWING ACREAGE STRATA :

19001 . 19002 19003

AREA ESTIMATE =	9230.8516
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	290259.187
ROOT MEAN SQUARED PREDICTION ERROR =	538.7571
PRODUCTION ESTIMATE =	1128141.00
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	8398069760.
ROOT MEAN SQUARED PREDICTION ERROR =	91641.0000

E S T I M A T E S FOR REGION

THE REGION INCLUDES THE FOLLOWING ACREAGE STRATA :

17001 17002 17003 17004 18001 18002
18003 18004 18005 19001 19002 19003

AREA ESTIMATE =	29510.2305
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	685817.562
ROOT MEAN SQUARED PREDICTION ERROR =	828.1411
PRODUCTION ESTIMATE =	3303209.00
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	15714938900.
ROOT MEAN SQUARED PREDICTION ERROR =	125359.250

ESTIMATES FOR ARBRITARY SET 1.

THIS SET INCLUDES THE FOLLOWING ACREAGE STRATA :

17001 18001 18005

AREA ESTIMATE =	10207.5820
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	117792.125
ROOT MEAN SQUARED PREDICTION ERROR =	343.2085
PRODUCTION ESTIMATE =	1224001.00
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	2290817280.
ROOT MEAN SQUARED PREDICTION ERROR =	47862.4844

ESTIMATES FOR ARBRITARY SET 2.

THIS SET INCLUDES THE FOLLOWING ACREAGE STRATA :

17002 18002 19001

AREA ESTIMATE =	5056.3320
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	10573.6445
ROOT MEAN SQUARED PREDICTION ERROR =	102.8282
PRODUCTION ESTIMATE =	579563.687
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	469888512.
ROOT MEAN SQUARED PREDICTION ERROR =	21676.9141

ESTIMATES FOR ARBRITARY SET 3.

THIS SET INCLUDES THE FOLLOWING ACREAGE STRATA :

17003 18003 19002

AREA ESTIMATE =	5727.4609
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	266036.687
ROOT MEAN SQUARED PREDICTION ERROR =	515.7874
PRODUCTION ESTIMATE =	459666.562
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	4559142910.
ROOT MEAN SQUARED PREDICTION ERROR =	67521.4375

ESTIMATES FOR ARBRITARY SET 4.

THIS SET INCLUDES THE FOLLOWING ACREAGE STRATA :

17004 . 18004 19003

AREA ESTIMATE =	8518.8867
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	88614.8125
ROOT MEAN SQUARED PREDICTION ERROR =	297.6824
PRODUCTION ESTIMATE =	1039979.25
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	1822762240.
ROOT MEAN SQUARED PREDICTION ERROR =	42693.8203

```
FILE: CONSOLE  FILE     A   EODL / JOHNSON SPACE CENTER


GOAT
 NO  FILES CHANGED

      ( TO TERMINATE THIS SESSION, HERE OR AT ANY SUCCEEDING
        QUESTIONS, ENTER   HX   .)

      FOR THE CONTROL CARD FILE ENTER:  FILE-NAME   FILE-TYPE   (FILE-MO
VCHECK CC G
CONTROL CARD FILE TO BE USED IS: VCHECK CC G

      FOR THE DATA FILE ENTER:  FILE-NAME  FILE-TYPE  (FILE-MODE)
VCHECK DATA G
DATA FILE TO BE USED IS: VCHECK DATA G

      DO YOU WANT BATCH OR INTERACTIVE?     E N T E R : BAT/INTER
INTER

      DO YOU WANT THE OUTPUT ON A CMS DISK FILE OR SENT TO THE
      PRINTER?  ENTER   FILE/PRT
PRT
6F
EXECUTION BEGINS...
6F
CONSOLE FILE IS READ ONTO YOUR A DISK AS: CONSOLE FILE A.
```

EXAMPLE USING VCHECK CC

```
INPUT SUMMARY
CHECK OUT   6
AREA ST     14
HIST YRS    8
RATIO YR    7
HMATRIX YR  8
GAP         1
OPTION SET  3
SCALE       1000
CROP        SPRING SMALL GRAINS
JOIN        21001,21002,21006,21010
JOIN        21002,21001,21006
JOIN        19003,19004,19007
JOIN        19004,19003,19007
JOIN        20005,20009
JOIN        21006,21001,21002,21010,&
     JOIN 21011,21012,21013
JOIN        19007,19003,19004,19008
JOIN        19008,19007,19014
JOIN        20009,20005
JOIN        21010,21001,21006,21011
JOIN        21011,21006,21010,21012
JOIN        21012,21006,21011,21013
JOIN        21013,21006,21012
JOIN        19014,19008
UNITS       AREA: ACRES IN 1000'S     YIELD: BUSHELS/ACRE
PZONE       21010,21011,19004,19008
PZONE       19003,19004,19007,21010,20005
PZONE       20005,20009,19008,19003
COMMENTS    GOAT AGGREGATION FOR ND SEGMENT DATA
COMMENTS    DATABASE USED: SASBASE.NDGROUPS     VARIABLES USED: SYCPE79 , SYCPV79
COMMENTS    THE USDA SSG ACREAGES FOR 1978 WERE USED FOR RATIOING
```

```
 NSET =      2
 ISET =    1   4   0   0   0   0   0   0   0   0   0   0   0   0
 H MATRIX IS  0.35144E+03 0.70332E+02 0.0          0.0          0.0          0.0          0.0          0.0
 H MATRIX IS  0.0         0.0         0.0          0.0          0.0
RATIO =     0.732673287     VOPTJ =       117819.500  VOPTIJ =       160807.687
-------------------------------------------------------------------------------
 NSET =      2
 ISET =    3   4   0   0   0   0   0   0   0   0   0   0   0   0
 H MATRIX IS  0.64601E+03 0.91368E+02 0.0          0.0          0.0          0.0          0.0          0.0
 H MATRIX IS  0.0         0.0         0.0          0.0          0.0
RATIO =     0.787669063     VOPTJ =       83004.3750 VOPTIJ =       105379.750
-------------------------------------------------------------------------------
  NEW GROUP IS   3  DELETED GROUP IS =  4
  GROUPING =    1   2   3   3   5   6   7   8   9  10  11  12  13  14
  NEW H MATRIX
        0.0         0.0        646.010      91.368       0.0          0.0          0.0          0.0          0.0          0.0
        0.0         0.0         0.0         0.0
  HISTORICAL TEST DATA =    761.400   998.300  1141.300     0.0      838.000   448.600  1085.000   873.800  1437.200  1191.000
1103.700  1152.600  1135.300  1363.800
  RETAINED VOPTIJ =     117819.500      51420.301      105379.750          0.0          0.0      33652.199      87856.625
  22173.199      79095.625      20915.602      81413.687      56396.199      64240.398      97124.875
*******************************************************************************************************************
 NSET =      3
 ISET =    3   4   5   0   0   0   0   0   0   0   0   0   0   0
 H MATRIX IS  0.58513E+03 0.78577E+02 0.48560E+03 0.0          0.0          0.0          0.0          0.0
 H MATRIX IS  0.0         0.0         0.0          0.0          0.0
RATIO =     0.331661165     VOPTJ =       105379.750  VOPTIJ =       317733.125
-------------------------------------------------------------------------------
 NSET =      2
 ISET =    5   6   0   0   0   0   0   0   0   0   0   0   0   0
 H MATRIX IS  0.74145E+03 0.41138E+03 0.48560E+03 0.0          0.0          0.0          0.0          0.0
 H MATRIX IS  0.0         0.0         0.0          0.0          0.0
RATIO =     0.120622914     VOPTJ =       33652.1992 VOPTIJ =       278987.000
-------------------------------------------------------------------------------
  NEW GROUP IS   3  DELETED GROUP IS =  5
  GROUPING =    1   2   3   3   3   6   7   8   9  10  11  12  13  14
  NEW H MATRIX
        0.0         0.0        585.129      78.577      485.603      0.0          0.0          0.0          0.0          0.0
        0.0         0.0         0.0         0.0
  HISTORICAL TEST DATA =    761.400   998.300  1979.300     0.0      0.0      448.600  1085.000   873.800  1437.200  1191.000
1103.700  1152.600  1135.300  1363.800
  RETAINED VOPTIJ =     117819.500      51420.301      317733.125          0.0          0.0      33652.199      87856.625
  22173.199      79095.625      20915.602      81413.687      56396.199      64240.398      97124.875
*******************************************************************************************************************
 NSET =      4
 ISET =    3   4   5   6   0   0   0   0   0   0   0   0   0   0
 H MATRIX IS  0.98239E+03 0.13536E+03 0.91656E+03 0.45859E+03
 VOPTIJ =       322781.500     VOPTI=        33652.1992   VOPTJ=       317733.125
 RATIO =  1.08861637
-------------------------------------------------------------------------------
 NSET =      2
 ISET =    6   7   0   0   0   0   0   0   0   0   0   0   0   0
 H MATRIX IS  0.17231E+03 0.37498E+03
 VOPTIJ =       121362.687     VOPTI=        33652.1992   VOPTJ=       87856.6250
 RATIO =  1.00120354
-------------------------------------------------------------------------------
  NEW GROUP IS   6  DELETED GROUP IS =  3
  GROUPING =    1   2   6   6   6   6   7   8   9  10  11  12  13  14
  NEW H MATRIX
        0.0         0.0        982.388     135.363      816.563      458.595      0.0          0.0          0.0          0.0
        0.0         0.0         0.0         0.0
  HISTORICAL TEST DATA =    761.400   998.300     0.0          0.0          0.0     2427.900  1085.000   873.800  1437.200  1191.000
1103.700  1152.600  1135.300  1363.800
  RETAINED VOPTIJ =     117819.500      51420.301          0.0          0.0          0.0      322781.500      87856.625
  22173.199      79095.625      20915.602      81413.687      56396.199      64240.398      97124.875
*******************************************************************************************************************
 NSET =      2
 ISET =    1   2   0   0   0   0   0   0   0   0   0   0   0   0
 H MATRIX IS  0.34511E+03 0.38005E+03
 VOPTIJ =       127578.875     VOPTI=        117819.500     VOPTJ=       51420.3008
 RATIO =  1.32654953
-------------------------------------------------------------------------------
 NSET =      5
 ISET =    1   3   4   5   6   0   0   0   0   0   0   0   0   0
 H MATRIX IS  0.86565E+03 0.11195E+04 0.15664E+03 0.93142E+03 0.52758E+03
 VOPTIJ =       439018.437     VOPTI=        117819.500     VOPTJ=       322781.500
 RATIO =  1.00360394
```

```
 HISTORICAL TEST DATA =  1759.700      0.0        0.0        0.0        0.0     2427.900  1085.888   873.888  1437.200  1191.888
1103.700    0.0     1135.300   1363.800
 RETAINED VOPTIJ =    127578.875          0.0              0.0              0.0              0.0              322781.500       87856.625
 22173.199       79095.625       20915.602       81413.687       56396.199       64240.398       97124.875
*****************************************************************************************************************************
 NSET =     2
 ISET =     8  12   0   0   0   0   0   0   0   0   0   0   0
 H MATRIX IS  0.11293E+04 0.14648E+04
 VOPTIJ =          71079.6875    VOPTI=        22173.1992    VOPTJ=        56396.1992
 RATIO =  1.10536957
-----------------------------------------------------------------------------------------------------------------------------
  NEW GROUP IS   8  DELETED GROUP IS = 12
  GROUPING =     1   1   6   6   6   6   7   8   9  10  11   8  13  14
  NEW H MATRIX
      345.106       380.053       982.388       135.363       816.563       458.595         0.0       1129.296         0.0         0.0
        0.0        1464.834         0.0           0.0
 HISTORICAL TEST DATA =  1759.700      0.0        0.0        0.0        0.0     2427.900  1085.888  2026.488  1437.200  1191.888
1103.700    0.0     1135.300   1363.800
 RETAINED VOPTIJ =    127578.875          0.0              0.0              0.0              0.0              322781.500       87856.625
 71079.687       79095.625       20915.602       81413.687         0.0          64240.398       97124.875
*****************************************************************************************************************************
 NSET =     5
 ISET =     3   4   5   6   7   0   0   0   0   0   0   0   0   0
 H MATRIX IS  0.15109E+04 0.20846E+03 0.12559E+04 0.70587E+03 0.15862E+04
 VOPTIJ =          390673.062    VOPTI=        87856.6250    VOPTJ=        322781.500
 RATIO =  1.05110359
-----------------------------------------------------------------------------------------------------------------------------
  NEW GROUP IS   7  DELETED GROUP IS =  6
  GROUPING =     1   1   7   7   7   7   7   8   9  10  11   8  13  14
  NEW H MATRIX
      345.106       380.053      1510.855       208.458      1255.928       705.872      1586.190      1129.296         0.0         0.0
        0.0        1464.834         0.0           0.0
 HISTORICAL TEST DATA =  1759.700      0.0        0.0        0.0        0.0        0.0     3512.988  2026.488  1437.200  1191.888
1103.700    0.0     1135.300   1363.800
 RETAINED VOPTIJ =    127578.875          0.0              0.0              0.0              0.0              0.0              390673.062
 71079.687       79095.625       20915.602       81413.687         0.0          64240.398       97124.875
*****************************************************************************************************************************
 NSET =     3
 ISET =     8  11  12   0   0   0   0   0   0   0   0   0   0
 H MATRIX IS  0.18862E+04 0.22077E+04 0.24  3E+04
 VOPTIJ =          135551.937    VOPTI=        1413.6875    VOPTJ=        71079.6875
 RATIO =  1.12498093
-----------------------------------------------------------------------------------------------------------------------------
 NSET =     2
 ISET =     9  11   0   0   0   0   0   0   0   0   0   0   0
 H MATRIX IS  0.19534E+04 0.14206E+04
 VOPTIJ =          157238.000    VOPTI=        81413.6875    VOPTJ=        79095.6250
 RATIO =  1.02080441
-----------------------------------------------------------------------------------------------------------------------------
 NSET =     2
 ISET =    10  11   0   0   0   0   0   0   0   0   0   0   0
 H MATRIX IS  0.39558E+04 0.41866E+04
 VOPTIJ =          66354.1250    VOPTI=        81413.6875    VOPTJ=        20915.6836
 RATIO =  1.54216862
-----------------------------------------------------------------------------------------------------------------------------
  NEW GROUP IS  11  DELETED GROUP IS = 10
  GROUPING =     1   1   7   7   7   7   7   8   9  11  11   8  13  14
  NEW H MATRIX
      345.106       380.053      1510.855       208.458      1255.928       705.872      1586.190      1129.296         0.0      3955.888
     4186.566      1464.834         0.0           0.0
 HISTORICAL TEST DATA =  1759.700      0.0        0.0        0.0        0.0        0.0     3512.988  2026.488  1437.200     0.0
2294.700    0.0     1135.300   1363.800
 RETAINED VOPTIJ =    127578.875          0.0              0.0              0.0              0.0              0.0              0.0              390673.062
 71079.687       79095.625         0.0          66354.125         0.0          64240.398       97124.875
*****************************************************************************************************************************
 NSET =     2
 ISET =    13  14   0   0   0   0   0   0   0   0   0   0   0
 H MATRIX IS  0.49079E+04 0.60616E+04
 VOPTIJ =          159403.437    VOPTI=        64240.3984    VOPTJ=        97124.8750
 RATIO =  1.01230717
-----------------------------------------------------------------------------------------------------------------------------
  NEW GROUP IS  13  DELETED GROUP IS = 14
  GROUPING =     1   1   7   7   7   7   7   8   9  11  11   8  13  13
  NEW H MATRIX
      345.106       380.053      1510.855       208.458      1255.928       705.872      1586.190      1129.296         0.0      3955.888
     4186.566      1464.834      4907.875      6861.574
 HISTORICAL TEST DATA =  1759.700      0.0        0.0        0.0        0.0        0.0     3512.988  2026.488  1437.200     0.0
2294.700    0.0     2499.100   0.0
 RETAINED VOPTIJ =    127578.875          0.0              0.0              0.0              0.0              0.0              0.0              390673.062
 71079.687       79095.625         0.0          66354.125         0.0         159403.437         0.0
*****************************************************************************************************************************
 NSET =     3
 ISET =     9  10  11   0   0   0   0   0   0   0   0   0   0
 H MATRIX IS  0.41965E+04 0.28697E+04 0.30265E+04
 VOPTIJ =          131654.625    VOPTI=        79095.6250    VOPTJ=        66354.1250
 RATIO =  1.10474873
-----------------------------------------------------------------------------------------------------------------------------
```

```
NEW GROUP IS   9  DELETED GROUP IS =  11
GROUPING =    1   1   7   7   7   7   8   9   9   9   8  13  13
NEW H MATRIX
   345.106     380.053    1510.855     208.458    1255.928     705.872    1586.190    1129.296    4186.473    2869.704
  3026.470    1464.834    4907.875    6061.574
HISTORICAL TEST DATA =  1759.700      0.0         0.0         0.0         0.0         0.0        3512.900    2026.400    3731.900       0.0
   0.0         0.0        2499.100       0.0
RETAINED VOPTIJ =  127578.875          0.0         0.0         0.0         0.0         0.0         0.0         0.0        390673.062
 71079.687    131658.625          0.0         0.0         0.0        159403.437          0.0
```

```
NSET =     7
ISET =    1   2   3   4   5   6   7   0   0   0   0   0   0   0
H MATRIX IS  0.16593E+04 0.19525E+04 0.21365E+04 0.30347E+03 0.17792E+04 0.10163E+04 0.22277E+04
VOPTIJ =       499765.125    VOPTI=       127578.875    VOPTJ=       390673.062
RATIO =  1.03699017
```

```
NEW GROUP IS   1  DELETED GROUP IS =  7
GROUPING =    1   1   1   1   1   1   1   8   9   9   9   8  13  13
NEW H MATRIX
  1659.282    1952.536    2136.507     303.474    1779.229    1016.303    2227.678    1129.296    4186.473    2869.704
  3026.470    1464.834    4907.875    6061.574
HISTORICAL TEST DATA =  5272.598      0.0         0.0         0.0         0.0         0.0         0.0        2026.400    3731.900       0.0
   0.0         0.0        2499.100       0.0
RETAINED VOPTIJ =  499765.125          0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0
 71079.687    131658.625          0.0         0.0         0.0        159403.437          0.0
```

```
NSET =     5
ISET =    8   9  10  11  12   0   0   0   0   0   0   0   0   0
H MATRIX IS  0.31767E+04 0.51607E+04 0.34891E+04 0.37155E+04 0.41279E+04
VOPTIJ =       203942.625    VOPTI=       71079.6875    VOPTJ=       131658.625
RATIO =  0.9940947B9
```

```
NSET =     5

ISET =    8   9  10  11  12   0   0   0   0   0   0   0   0   0
H MATRIX IS  0.31767E+04 0.51607E+04 0.34891E+04 0.37155E+04 0.41279E+04
VOPTIJ =       203942.625    VOPTI=       131658.625    VOPTJ=       71079.6875
RATIO =  0.9940947B9
```

FINAL GROUPING OF THE ACREAGE STRATA IS :

CLASS	GROUP INDEX	ACTIVITY INDEX
1	1	2
2	1	2
3	1	2
4	0	2
5	0	2
6	1	2
7	1	2
8	1	2
9	1	2
10	1	2
11	1	2
12	1	2
13	1	2
14	1	3

AREA STRATA	DIRECT AREA ESTIMATE	HISTORICAL AREA	GROUP	GAMMA	H MATRIX
21001	717.05	761.40	1	0.909618	1659.282
21002	1170.02	994.30	1	0.909618	1952.536
21006	821.45	1013.40	1	0.909618	2136.507
21010	-1.00	127.90	1	0.909618	303.474
21011	-1.00	838.00	1	0.909618	1779.229
21012	563.38	448.60	1	0.909618	1016.303
21013	645.55	1085.00	1	0.909618	2227.678
19014	870.40	873.80	2	0.979456	1129.296
19001	1216.64	1437.20	3	0.869364	4186.473
19004	1187.72	1191.00	3	0.869364	2869.704
19007	840.02	1103.70	3	0.869364	3026.470
19008	1114.37	1152.60	2	0.979456	1464.834
20005	1162.37	1135.30	4	1.035809	4907.875
20009	1426.22	1363.80	4	1.035809	6061.574

X OPTIMAL WEIGHTING MATRIX

0.08920	0.26121	0.16648	0.0	0.0	0.18128	0.16437	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.11692	0.34258	0.21826	0.0	0.0	0.23757	0.22076	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.11869	0.34776	0.22156	0.0	0.0	0.24115	0.22410	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.01507	0.04361	0.02803	0.0	0.0	0.03076	0.02826	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]									
0.05260	0.15378	0.09812	0.0	0.0	0.10696	0.09919	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.12707	0.37235	0.23721	0.0	0.0	0.25817	0.23994	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.59815	0.0	0.0	0.0	0.31223	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.25270	0.72508	0.19068	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.20973	0.60038	0.15813	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.19449	0.55617	0.14659	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.77575	0.0	0.0	0.0	0.41189	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.50787	0.40968
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.61019	0.49205

DATA SUMMARY

THE CROP IS: SPRING SMALL GRAINS
THE UNITS FOR AREA AND PRODUCTION ARE:AREA: ACRES IN 1000'S YIELD: BUSHELS/ACRE

AREA STRATA	DIRECT AREA ESTIMATE	VARIANCE DIRECT AREA ESTIMATE	COEFFICIENT OF VARIATION DIRECT AREA ESTIMATE (PERCENT)	HISTORICAL AREA FOR RATIO YEAR
21001	717.85	117819.50	47.9	761.40
21002	1170.02	51420.30	19.4	998.30
21006	821.45	83004.37	35.1	1013.40
21010	-1.00	-1.00	0.0	127.90
21011	-1.00	-1.00	0.0	838.00
21012	563.38	33652.20	32.6	448.60
21013	645.55	87856.62	45.9	1085.00
19014	870.40	22173.20	17.1	873.80
19003	1216.64	79095.62	23.1	1437.20
19004	1187.72	20915.60	12.2	1191.00
19007	840.02	81413.69	34.0	1103.70
19008	1114.37	56396.20	21.3	1152.60
20005	1162.37	64240.40	21.8	1135.30
20009	1426.22	97124.87	21.9	1363.80

AREA STRATA	YIELD STRATA	YIELD ESTIMATE	VARIANCE OF TRUE YIELD	VARIANCE OF ESTIMATED YIELD	GROUP
21001	38	111.000	0.01	17.98	1
21002	38	111.000	0.01	17.98	1
21006	38	111.000	0.01	17.98	1
21010	38	111.000	0.01	17.98	1
21011	38	111.000	0.01	17.98	1
21012	38	111.000	0.01	17.98	1
21013	38	111.000	0.01	17.98	1
19014	38	107.900	0.01	27.29	2
19003	38	107.900	0.01	27.29	3
19004	38	107.900	0.01	27.29	3
19007	38	107.900	0.01	27.29	3
19008	38	107.900	0.01	27.29	2
20005	38	116.900	0.01	36.62	4
20009	38	116.900	0.01	36.62	4

ESTIMATES FOR ZONE 21.

THIS ZONE INCLUDES THE FOLLOWING ACREAGE STRATA :

21001 21002 21006 21010 21011 21012
21013

AREA ESTIMATE =	4966.2344
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	499764.500
ROOT MEAN SQUARED PREDICTION ERROR =	706.9402
PRODUCTION ESTIMATE =	551252.062
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	6580580350.
ROOT MEAN SQUARED PREDICTION ERROR =	81120.7500

ESTIMATES FOR ZONE 19.

THIS ZONE INCLUDES THE FOLLOWING ACREAGE STRATA :

19014 . 19003 19004 19007 . 19008

AREA ESTIMATE =	5444.2344
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	202738.062
ROOT MEAN SQUARED PREDICTION ERROR =	450.2644
PRODUCTION ESTIMATE =	587438.875
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	2856135680.
ROOT MEAN SQUARED PREDICTION ERROR =	53442.8281

ESTIMATES FOR ZONE 20.

THIS ZONE INCLUDES THE FOLLOWING ACREAGE STRATA :

20005 . 20009

AREA ESTIMATE =	2585.6494
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	159403.125
ROOT MEAN SQUARED PREDICTION ERROR =	399.2532
PRODUCTION ESTIMATE =	302262.500
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	2301953020.
ROOT MEAN SQUARED PREDICTION ERROR =	47978.6719

E S T I M A T E S FOR REGION

THE REGION INCLUDES THE FOLLOWING ACREAGE STRATA :

21001	21002	21006	21010	21011	21012
21013	19014	19003	19004	19007	19008
20005	20009				

AREA ESTIMATE =	12996.1055
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	861905.750
ROOT MEAN SQUARED PREDICTION ERROR =	928.3887
PRODUCTION ESTIMATE =	1440952.00
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	13574721500.
ROOT MEAN SQUARED PREDICTION ERROR =	116510.625

ESTIMATES FOR ARBRITARY SET 1.

THIS SET INCLUDES THE FOLLOWING ACREAGE STRATA :

21010 21011 19004 19008

AREA ESTIMATE =	3155.5408
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	56907.5000
ROOT MEAN SQUARED PREDICTION ERROR =	238.5529
PRODUCTION ESTIMATE =	342171.937
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	845202944.
ROOT MEAN SQUARED PREDICTION ERROR =	29072.3750

ESTIMATES FOR ARBRITARY SET 2.

THIS SET INCLUDES THE FOLLOWING ACREAGE STRATA :

21010 . 19003 · 19004 19007 20005

AREA ESTIMATE =	4744.3672
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	167162.375
ROOT MEAN SQUARED PREDICTION ERROR =	408.8550
PRODUCTION ESTIMATE =	522961.125
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	2393032450.
ROOT MEAN SQUARED PREDICTION ERROR =	48918.6328

ESTIMATES FOR ARBRITARY SET 3.

THIS SET INCLUDES THE FOLLOWING ACREAGE STRATA.:

19003 . 19008 20005 20009

AREA ESTIMATE =	5043.0664
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	206299.687
ROOT MEAN SQUARED PREDICTION ERROR =	454.2021
PRODUCTION ESTIMATE =	568022.625
ESTIMATE OF MEAN SQUARED PREDICTION ERROR =	3173944060.
ROOT MEAN SQUARED PREDICTION ERROR =	56337.7695

* U.S. GOVERNMENT PRINTING OFFICE: 1982—500-011/1388